Exploring my watershed



My closest body of water is...

_____

The closest principal river to where I live is...

_____

On its way to the ocean, the water in this river flows through...[describe the path the water takes toward its destination]

_____

_____

The water eventually flows into_____, which makes it part of the _____ [ocean] watershed.

My local watershed is known as the _____watershed.

Some things I notice about the shape of my local watershed...

_____

Some things I notice about the boundaries of my local watershed...

_____

Some things I notice about how the boundaries of my local watershed interact with treaty boundaries...

_____

Some things I notice about how the boundaries of my watershed interact with other political boundaries on the map...

_____

Sketch of the overall shape of my local watershed:

Melting glacier observations



1. **Before you start, predict:**

   What will happen with each set of ice cubes? _____

   Which set of ice cubes will melt faster? _____

2. **Set your timer. Ready, set, go! Measure the water level in each container at 10-minute intervals.**

   Container 1: Ice cubes only

   Measurements: 10 minutes: _____ 20 minutes: _____ 30 minutes: _____

   Other observations: _____

   Container 2: Ice cubes with water

   Measurements: 10 minutes: _____ 20 minutes: _____ 30 minutes: _____

   Other observations: _____

3. **Conclusions: How do your observations compare to your predictions? What have you learned?**

4. **Experiment:** Try the activity again, experimenting with the water temperature or relocating the containers to a warmer or colder location. Record the changes that you introduced, your predictions, how the changes affect the results and any conclusions.

_____

_____

_____

_____

_____

_____

Groundwater facts



Groundwater is rain, snow and other precipitation that seeps into the soil and passes through tiny spaces (pores) in soil, rocks and other materials under the surface. Groundwater slowly flows toward streams, lakes and wetlands aboveground, but underground it is not concentrated in channels or rivers. It spreads out and exists almost everywhere beneath our feet.

Depending on the pores in the material it is moving through, water can flow slowly or quickly. **Porosity** is how much empty space there is inside the grains of a material to store water. **Permeability** is how well-connected the empty spaces are to each other for water to flow through.

Although groundwater exists everywhere, some areas are especially soaked with it. These are called **aquifers**. An aquifer is not a pocket of water like a lake. Instead, it is more like a giant sponge underground that holds the water until it finds a way out to the surface as a spring or is drawn out by people using a well or pump. Aquifers can be small or they can be huge.

The line between the saturated (soaked) area underground and unsaturated areas above it is called the water table. The **water table** can rise when more water is added and become lower when water is used or drained.

Groundwater and surface water feed each other. Surface water seeps underground to become groundwater and groundwater can resurface (usually in the form of a spring) and replenish surface water.

Groundwater supplies about half of the world's drinking water. In Canada, groundwater provides drinking water to about one third of Canadians and up to 80 per cent of Canadians outside of cities.

Modelling groundwater



1. **Before you start, predict:**

   Which material will allow water to drain the fastest from the top to the bottom of the container? _____

   _____

   Which material will make the water drain most slowly? _____

2. **Set your timer. Ready, set, go! Time your water flow.**

   How fast does the water drain from the surface to the bottom of each container? _____

3. **Measure from the top of the container to the top of the saturated area.**

   What is the depth of your water table? _____

4. **Compare with other groups:**

   Which material is the most porous? Record any other observations.

_____

_____

_____

5. **Experiment:**

   Use a pump from a soap refill container to try pumping water from each container to the surface. What happens when water is pumped? Record your observations.

_____

_____

_____

   Drip a few drops of a different colour of food colouring at the surface of each container. What happens to the food colouring as it moves through the soil and other materials? Record your observations.

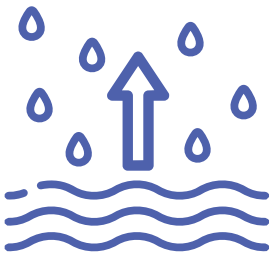
_____

_____

_____

Stages of the water cycle

Evaporation and transpiration



- **Evaporation** is a process where water from oceans and other bodies of water (and also water from wet surfaces and even sweat) absorbs heat from the sun and changes into water vapour that rises up into the atmosphere. Energy from the sun is key to the water cycle.
- This water vapour is an invisible gas that moves quickly and often travels from the ocean over land. Water vapour is everywhere around us in the air we breathe.
- Since most of Earth's water is stored in the ocean, the ocean plays a major role in evaporation. Evaporation separates water molecules from the salt and other minerals, which are left behind in the ocean. The water vapour formed is not salty, even if you live near an ocean.
- Water vapour is also released into the atmosphere through tiny holes in the leaves of plants. This is called **transpiration.**
- Evaporation and transpiration together are known as **evapotranspiration.**

Condensation



- Up in the atmosphere, water vapour loses energy, cools and turns into tiny water droplets or ice crystals. Water vapour changing to liquid is called condensation.
- Water vapour often clusters around particles already suspended in the atmosphere (dust, water droplets, ice crystals). The water droplets condense together, turning back into liquid and form clouds.
- We can see clouds because they are made up of liquid water droplets, not vapour or gas.
- Since clouds drift around the atmosphere, they are one way that water moves from one place to another around the globe.

Stages of the water cycle



Precipitation



- Once the clouds are heavy enough, gravity takes over. The water falls back down to the Earth's surface. This is called **precipitation.**
- Precipitation can fall in liquid form as rain or in solid or frozen form as snow, ice, sleet or hail.
- Fog and mist are made of tiny liquid water droplets suspended in the air near the ground. They form when water vapour condenses onto dust and other particles, but the droplets are too small and light to fall as precipitation. Fog and mist are therefore a form of condensation rather than a stage between vapour and liquid.
- Precipitation always falls as freshwater, even if the water vapour started as salty ocean water.
- Although precipitation falls as freshwater, water molecules in the atmosphere can sometimes mix with other substances (sulfur, nitrogen) that have been emitted into the atmosphere and create acid rain. Acid rain is harmful to freshwater, soil and living things.

Collection, infiltration and surface runoff



- Water can fall onto the surface water on Earth and collect into streams, rivers and oceans. This is called **collection**.
- Water can fall into the soil and, pulled down by gravity, soak down into groundwater and aquifers. This is called **infiltration**.
- Depending on the surface (e.g., paving, frozen ground, or soil that is already soaked), water can also collect into **surface runoff**. Surface runoff flows toward a storm-drain system (in an urban area) or toward a surface stream without first soaking down through the soil.
- Meltwater from glaciers or snowpacks is another form of runoff.