

Lesson Plans



MOSS

McCALL OUTDOOR SCIENCE SCHOOL

University of Idaho

College of Natural Resources



Title: Temperature
Grade Level: 5th-8th grade

Topic:	Temperature
Background:	<p>Temperature is the measure of how much heat energy water contains. It can be measured with a thermometer or temperature probe. The temperature of a body of water affects its overall quality. Cool, clear water is vital to the health of fish and the natural community as a whole. Suitable temperature ranges are important for all life history stages of salmon and trout: adult migration, spawning, egg incubation, embryo development, and juvenile rearing, and juvenile migration. During summer months, water temperature has the potential to become too high to sustain life. Water temperature is affected by: air temperature, amount of shade from direct sunlight, soil erosion and turbidity (i.e., amount of suspended solids in the water), thermal pollution from human activity (e.g., companies diverting and using water and then returning it warmer than it was before, storm runoff being warmed by relatively hot roofs and parking lots, etc.), and confluence with warmer or cooler streams.</p>
Next Generation Standards:	PS3.E, PS3. B, LS2.A & LS2.C
Goals:	<p>Students will act out the difference in motion of hot and cool water molecules. It will help them understand temperature and how it relates to dissolved oxygen, wildlife habitat, and human impacts.</p> <p>Essential questions for the students:</p> <ul style="list-style-type: none"> • How do warm water and cold water differ? • How does temperature affect dissolved oxygen? • How does temperature affect wildlife?
Objectives:	<ul style="list-style-type: none"> • Students will understand that water is made up of molecules. How fast or slow the molecules move indicates how hot or cold the water is. • Students will understand that water temperature affects animal habitat.

	<ul style="list-style-type: none"> • Students will be aware that humans impact water temperature.
Materials:	<ul style="list-style-type: none"> • Thermometer or temperature probe • 4 buckets or containers of any size • White/chalk board and markers/chalk
Set up:	<ul style="list-style-type: none"> • Fill 4 buckets with water. • Place 2 outside and leave 2 inside a day before or the morning of this activity.
Classroom Time:	1 session - 40-45 minutes
Introduction (Engage):	Start by asking the students to discuss with the person next to them what they think temperature is, and how it is measured. Ask them what they think water is made of. Ask them to form a hypothesis about how temperature affects water. Have the students write their ideas and hypothesis on the chalk/white board.
Activity (Explore):	<p>Ask the students to stand up and pretend to be water molecules. Ask them to move and walk around as if they were hot water molecules (they should move around quickly, but safely). Now ask them to move as if the water gets cooler (they should gradually slow down). Ask them which temperature was more exhausting as a water molecule? (Warmer).</p> <p>Have the students measure the indoor buckets and outdoor buckets with the measuring device (thermometer or temperature probe) and take an average for each.</p>
Explanation	Ask the students what factors might have influenced the temperature of the water in the buckets outside vs. inside (sun, shade). Now you can discuss that most aquatic organisms are cold-blooded which means they adapt their core temperatures to surrounding temperatures. As the water temperature increases, aquatic organisms' metabolisms increase. See if the students know what metabolisms are. If they don't, explain that metabolisms are the part of organisms that break down sugars to create energy using oxygen.

	<p>If water temperature increases, and metabolisms increase, the demand for dissolved oxygen (DO) increases. Ask the students how the DO demand would differ if water temperatures decrease. Ask the students to revisit their hypothesis and decide whether or not it was supported.</p>
<p>Elaboration:</p>	<p>Now have the class divide into smaller groups of 5 or 6 students and have each group make a circle, standing shoulder to shoulder with all their arms and hands in the center of the circle. Tell them to act like water molecules at higher temperatures. They should move their arms and hands very quickly. Tell them to cool down and slow down. Do this again, but this time ask the students to observe how the available space for air changes with the change in temperature. Explain that as temperature increases, the capacity for holding dissolved oxygen decreases. Explain that cooler water has a greater capacity or potential for holding dissolved oxygen molecules that fish, insects, frogs, and other animals need to survive. Have the students think, pair, and share: why is temperature important for life in an aquatic ecosystem?</p>
<p>Evaluation:</p>	<p>At that point, engage them into a discussion that ties temperature, water molecules, and aquatic life together. Have the students think of some local fish, plant, or other animal species that you are aware of or have studied. How are they affected by temperature and what temperatures might they need to thrive?</p>

Additional resources:

<http://www.fws.gov/southeast/fisheries/BiT/teachers.html>