

Planning Sheet for Single Science Lessons	Lesson Title: Bioaccumulation	Cluster: 1 S.L.O: S2-1-03 Grade: 10
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Learning Outcomes/Goal Focus	Teacher Reminders – Learners Tasks	Equipment Required
<p>A. Cluster 0:Scientific Inquiry <u>Initiating, Researching & Planning</u> Summarize and record information in a variety of forms. <u>Implementing: Observing, Measuring & Recording</u> Record, organize, and display data using an appropriate format. Include: labelled diagrams, graphs, multimedia <u>Analyzing & Interpreting</u> Interpret patterns and trends in data and infer and explain relationships. <u>Concluding & Applying</u> Reflect on prior knowledge and experiences to develop new understanding.</p> <p>B. STSE Issues/ Design Process/ Decision Making N/A</p> <p>C. Essential Science Knowledge Summary In this lesson students will review what they learned in grade 7 on food chains and webs. The flow of energy in a food chain decreases as you go up trophic levels. This is why food chains should not contain many levels. Most animals are apart of many food chains, (which lead to a food web), in order to meet all their energy requirements. Students will learn that bioaccumulation occurs when non-biodegradable substances are concentrated and stored in organisms. These contaminants will rise from the bottom of the food chain to the top of the food chain, increasing in concentration. (From S2 curriculum documents). This threatens the health of animals near the top of the food chain including humans. <i>Will you assess? If so, what?</i> Their ability to understand the activity and</p>	<ol style="list-style-type: none"> Begin class by activating prior knowledge of food chains and webs. One by one ask students to draw/write one part of a food chain until a complete food chain is drawn. Note and verify any misconceptions such as the direction of arrow from food source going to consumer. Ask students “Where in the food chain is there the most/least food/energy available? And why?” Emphasize to students that most animals are a part of many food chains and will eat more than one kind of food to meet their food and energy requirements. Get students to come to the board to create a food web by making a series of interconnecting food chains. Introduce bioaccumulation by asking students whether they can guess the meaning of the word before giving them the proper definition. Demonstrate bioaccumulation through role-play. Create the play area in the classroom as lake Winnipeg. <p>Activity 30~45minutes</p> <ol style="list-style-type: none"> Each student gets 1 paper cup with 40 paperclips, 4 of which must be colourful and the rest plain metal. Assign each student to be predator or prey and give them the corresponding organism card to wear around their necks. There should be more prey than predators, about 4 times more. Every 5 student should be a northern pike, the rest are perch with 2~3 students being humans. Have students scatter their paper clips or zooplankton around the room in specified areas. The prey are released in the lake and allowed to eat. Emphasize that preys (perch) want to eat the paperclips or zooplankton by collecting them into their paper cups. After a few minutes, the predators/northern pikes are released. They can eat zooplankton but prefer perch. To eat a perch they must win at rock paper scissors. In winning they get all the prey’s paperclips/zooplankton and the eaten prey can continue to eat zooplankton because there are more preys than predators. However, if the predator loses at rock paper scissors the prey can keep all their food, escape and continue eating zooplankton. After a few minutes the predator/humans are allowed to go fishing. They can fish and eat either perch or northern pike but cannot eat zooplankton. Again, only Humans who win at rock scissor papers can eat their prey including all their food they ate. Continue playing until the lake runs out of zooplankton, and then get students to return to their seats. Let students know that some of the food contains chemicals such as mercury and are now in their body. Mercury has been in the lake for a long time and has moved up the food chain. Mercury is represented by the coloured paperclips. Get students to count the number of coloured paperclips they have. 	<p>Reference: Manitoba Fisheries website on Sustainable Development and bioaccumulation</p> <p>Paper cups for each student 40 Paper clips for each student (4 must be colourful). Organism picture Cards with names for students to wear around their necks: perch, northern pike and human card.</p> <hr/> <p>Questions to consider in your planning / delivery</p> <ol style="list-style-type: none"> How long will each phase last? How am I going to organize working groups? How will I organise and distribute equipment? What specific skill and knowledge development am I emphasizing?

its outcome.
How will you assess it? Informally during role-play by walking around and through questioning to check for understanding.

15. Have students make a chart of how much mercury each prey and predator consumed.
16. Discuss the findings of the chart. Emphasize that predators that have consumed the most will have higher amounts of mercury in their bodies than preys.

5. Is there evidence of clear instructions and purposeful questions?
6. What must I look for in monitoring student learning?
7. How can I diversify instruction?

Learning Outcomes/Goal Focus	Teacher Reminders – Learners Tasks	Equipment Required
<p>B. Cluster 0:Scientific Inquiry <u>Initiating, Researching & Planning</u> Select and integrate information obtained from a variety of sources. Summarize and record information in a variety of forms. <u>Implementing: Observing, Measuring & Recording</u> Select and use appropriate methods and tools for collecting data or information.</p> <p><u>Analyzing & Interpreting</u> Interpret patterns and trends in data, and infer and explain relationships.</p> <p><u>Concluding & Applying</u> Draw a conclusion that explains the results of an investigation.</p> <p>D. STSE Issues/ Design Process/ Decision Making N/A</p> <p>E. Essential Science Knowledge Summary In this lesson students will look at various news articles to become aware of local and global issues of contaminants that lead to bioaccumulation as they impact living organism and humans (consumers).</p> <p>Will you assess? If so, what? Formal assessment on radio/news script assignment.</p> <p>How will you assess it? Assessment of assignment will be based on a rubric out of 10 marks.</p>	<p>1. Start class 2 by having students hypothesize how contaminants such as mercury ended up in lake Winnipeg in last day’s role-play activity. Emphasize that there are both natural and manmade sources with the latter being most the harmful.</p> <p>2. Show students 5 minute video on the impacts of mercury from http://www.empowereddoctor.com/story.php?id=622</p> <p>3. Ask students “From the video, what is the effects of mercury poisoning on humans?” “What is a primary source of mercury?” “How can humans be contaminated with mercury?” Recall the bioaccumulation activity of last day’s class. Ask students “As a result of bioaccumulation which organism in the food chain is exposed to the most concentration of contaminants?”</p> <p><u>Activity:</u></p> <p>4. Break class into groups of 2s.</p> <p>5. Give each pair an article related to a contaminant (lead, mercury, dioxins or PCB’s).</p> <p>6. Instruct that as pairs, they will have to make a radio/news script of their article. In the content their script must introduce themselves, where they are, the topic, include any health risks or safety measures and where to get further information. This is an in class assignment to be worth 10 points. Only 1 copy for each group is to be handed in.</p> <p>7. Give them an example news/radio script (See Radio article document).</p> <p>8. Students start their assignment (30~40 minutes).</p> <p>Finish lesson by asking, “what are other examples of chemicals that can bioaccumulate in our environment?” “What are their sources?” “How do they threaten us or other organisms in our environment?” Students should come to an understanding that toxic chemicals created by humans, affect living organisms within a food chain and these sources are an immediate threat to our health.</p>	<p>Computer with internet connection LCD Projector and monitor Pollutant related newspaper articles http://www.cbc.ca/health/story/2002/09/23/mercury020923.html http://www.cbc.ca/consumer/story/2007/06/14/recall-trains.html http://www.cbc.ca/consumers/market/files/health/leadreno/ http://www.cbc.ca/world/story/2006/09/06/china-poisoning.html http://www.cbc.ca/news/background/foodsafty/fish.html http://www.cbc.ca/news/background/environment/toxins.html http://www.cbc.ca/health/story/2007/10/02/bc-toxic.html#skip300x250 http://www.cbc.ca/news/story/2002/10/21/mercuryfish_021021.html http://www.cbc.ca/canada/manitoba/story/2007/03/02/tuna-labels.html http://www.cbc.ca/world/story/2007/09/04/mattel-recall.html http://www.cbc.ca/news/story/2007/09/26/toys-recall.html</p> <hr/> <p>Questions to consider in your planning / delivery</p> <p>8. How long will each phase last?</p> <p>9. How am I going to organize working groups?</p> <p>10. How will I organise and distribute equipment?</p> <p>11. What specific skill and knowledge development am I emphasizing?</p> <p>12. Is there evidence of clear instructions and purposeful questions?</p> <p>13. What must I look for in monitoring student learning?</p> <p>14. How can I diversify instruction?</p>