

# Connecting Energy to Physical and Chemical Processes

By Jessica Smith

## Connections to the Curriculum for Grade 2:

<b>Science Grade 2</b>	
<b>Big Idea</b>	<ul style="list-style-type: none"><li>• Materials can be changed through physical and chemical processes</li></ul>
<b>Curricular Competencies</b>	<ul style="list-style-type: none"><li>• Demonstrate curiosity and a sense of wonder about the world</li><li>• Observe objects and events in familiar contexts</li><li>• Ask questions about familiar objects and events</li><li>• Make simple predictions about familiar objects and events</li><li>• Make and record observations</li><li>• Safely manipulate materials to test ideas and predictions</li><li>• Make and record simple measurements using informal or non-standard methods</li><li>• Sort and classify data and information using drawings, pictographs and provided tables</li><li>• Compare observations with predictions through discussion</li><li>• Compare observations with those of others</li><li>• Consider some environmental consequences of their actions</li><li>• Communicate observations and ideas using oral or written language, drawing, or role-play</li></ul>
<b>Content</b>	<ul style="list-style-type: none"><li>• Physical ways of changing materials</li><li>• Chemical ways of changing materials</li></ul>
<b>Key Questions</b>	<ul style="list-style-type: none"><li>• Why would we want to change the physical properties of an object?</li><li>• What are some natural processes that involve chemical and physical changes?</li></ul>
<b>Big Idea Cross-curricular Connections</b>	
<b>Applied Design, Skills and Technologies</b>	<ul style="list-style-type: none"><li>• Designs grow out of natural curiosity</li><li>• Skills can be developed through play</li></ul>
<b>Career Education</b>	<ul style="list-style-type: none"><li>• Effective collaboration relies on clear, respectful communication</li><li>• Everything we learn helps us to develop skills</li><li>• Learning is a lifelong enterprise</li></ul>
<b>English Language Arts</b>	<ul style="list-style-type: none"><li>• Stories and other texts can be shared through pictures and words</li><li>• Through listening and speaking, we connect with others and share our world</li><li>• Curiosity and wonder lead us to new discoveries about ourselves and the world around us</li></ul>
<b>Arts Education</b>	<ul style="list-style-type: none"><li>• Engagement in the arts creates opportunities for inquiry through purposeful play.</li><li>• People connect to others and share ideas through the arts.</li></ul>

## Energy Plan Outline with Brief Descriptions to Follow

*(Lesson 6 is completed in full below)*

<b>Lesson #1</b> Chemical and Physical Changes	<b>Lesson #2</b> Solids, Liquids and Gases	<b>Lesson #3</b> The water cycle	<b>Lesson #4</b> What is Energy?
<b>Lesson #5</b> Solar Energy and Chemical Changes in Plants	<b>Lesson #6</b> Flow of Energy in Food Chains	<b>Lesson #7</b> Create a Worm Composter	<b>Lesson #8</b> Plants and Chemical Changes
<b>Lesson #9</b> Lava Lamps and Yeast Balloon Experiments	<b>Lesson #10</b> Making Bubbles	<b>Lesson #11</b> Dry Ice Bubbles	<b>Lesson #12</b> Observing Changes in Plants and How They React to the Light

<b>Lesson 1 – Chemical and Physical Changes</b>	
<b>Lesson learning outcomes – Students will be able to:</b>	<ul style="list-style-type: none"> <li>• Differentiate between physical and chemical changes</li> <li>• Identify different signs of physical and chemical changes</li> <li>• Provide examples of physical and chemical changes</li> </ul>
<b>What will the teacher do?</b>	<ul style="list-style-type: none"> <li>• Reviewing and discuss matter and properties</li> <li>• Facilitate physical and chemical changes experiments</li> <li>• Show physical and chemical changes slideshow</li> <li>• Facilitate a discussion on “What have we learned?”</li> <li>• Explore Indigenous knowledge connections to chemical and physical changes</li> </ul>
<b>What will the student do?</b>	<ul style="list-style-type: none"> <li>• Engage in discussion of matter and properties</li> <li>• Explore how to make physical changes to a piece of paper</li> <li>• Explore the chemical changes with water, baking soda and vinegar in a mason jar</li> <li>• Watch a slide show on chemical and physical changes</li> <li>• Complete handout and share results with a partner</li> </ul>
<b>Assessment or Evaluation Assessment or Evaluation</b>	<ul style="list-style-type: none"> <li>• Observe student participation during discussions and activities</li> <li>• Review physical and chemical changes handout</li> <li>• Check for understanding of the difference between physical and chemical changes</li> </ul>
<b>Resources</b>	<a href="https://energyleaders.ca/sites/default/files/2019-">https://energyleaders.ca/sites/default/files/2019-</a>

	<p><a href="https://www.cdn.energyleaders.ca/sites/default/files/lessons/Gr2_Physical%20and%20chemical%20changes_SS.pdf">02/Grade%20%20sample%20lesson.pdf</a>  <a href="https://www.cdn.energyleaders.ca/sites/default/files/lessons/Gr2_Physical%20and%20chemical%20changes_SS.pdf">https://www.cdn.energyleaders.ca/sites/default/files/lessons/Gr2_Physical%20and%20chemical%20changes_SS.pdf</a></p> <p><a href="https://www.cdn.energyleaders.ca/sites/default/files/lessons/Gr2_Physical%20and%20chemical%20changes_SSN.pdf">https://www.cdn.energyleaders.ca/sites/default/files/lessons/Gr2_Physical%20and%20chemical%20changes_SSN.pdf</a></p> <p><a href="https://www.cdn.energyleaders.ca/sites/default/files/lessons/Gr2_Physical%20and%20chemical%20changes_SH.pdf">https://www.cdn.energyleaders.ca/sites/default/files/lessons/Gr2_Physical%20and%20chemical%20changes_SH.pdf</a></p> <p><a href="https://teachbcdb.bctf.ca/download/1161?filename=sd71webchemistryg2.pdf">https://teachbcdb.bctf.ca/download/1161?filename=sd71webchemistryg2.pdf</a></p>
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<b>Lesson 2 – Solids, Liquids and Gases</b>	
<b>Lesson learning outcomes – Students will be able to:</b>	<ul style="list-style-type: none"> <li>• Sort and classify common examples of solids, liquids and gases</li> <li>• Identify common properties of the three states of matter</li> <li>• Demonstrate how states of matter can change with changes in temperature</li> <li>• Demonstrate how particles move with changes in temperature</li> </ul>
<b>What will the teacher do?</b>	<ul style="list-style-type: none"> <li>• Facilitate discussion “Is it a solid, liquid or gas?” between students giving each of them cards that they have to think about and discuss with a partner</li> <li>• Get students to gather into groups according to properties of solids, liquids and gases</li> <li>• Use chart paper to classify ideas and discussions of solids, liquids or gases</li> <li>• Demonstrate physical changes with water</li> <li>• Get students to act out moving particles in solids, liquids and gases</li> </ul>
<b>What will the student do?</b>	<ul style="list-style-type: none"> <li>• Take a card with an image and decide whether it is a gas, liquid or solid, find a partner and discuss</li> <li>• Engage in activities and discussions</li> <li>• Observe demonstrations and ask questions</li> <li>• Actively participate in moving particle activity</li> </ul>
<b>Assessment or Evaluation</b>	<ul style="list-style-type: none"> <li>• Engagement and expression of prior knowledge in activities</li> <li>• Observe student responses to questions during the demonstration and physical activities</li> <li>• Observe participation in class activities</li> </ul>
<b>Resources</b>	<p><a href="https://www.cdn.energyleaders.ca/sites/default/files/lessons/Solids%2C%20liquids%20and%20gases%20lesson%20Grade%202.pdf">https://www.cdn.energyleaders.ca/sites/default/files/lessons/Solids%2C%20liquids%20and%20gases%20lesson%20Grade%202.pdf</a></p> <p><a href="https://www.cdn.energyleaders.ca/sites/default/files/lessons/Solids%2C%20liquids%20and%20gases%20cards%20Grade%202.pdf">https://www.cdn.energyleaders.ca/sites/default/files/lessons/Solids%2C%20liquids%20and%20gases%20cards%20Grade%202.pdf</a></p>

<b>Lesson 3 – The Water Cycle</b>	
<b>Lesson learning outcomes – Students will be able to:</b>	<ul style="list-style-type: none"> <li>• Identify and demonstrate ways they use water every day</li> <li>• Discuss how water cycles through the environment</li> <li>• Name the parts of the water cycle</li> <li>• Understand that the changes in the water cycle are physical</li> </ul>
<b>What will the teacher do?</b>	<ul style="list-style-type: none"> <li>• Facilitate a game of water charades</li> <li>• Facilitate group discussion to access prior knowledge</li> <li>• Water cycle activity with cut out cards</li> <li>• Explain the water cycle and the importance of the sun</li> <li>• Help the class to pretend to be water droplets and create actions for the different parts of the water cycle</li> </ul>
<b>What will the student do?</b>	<ul style="list-style-type: none"> <li>• Engage in water charades game</li> <li>• Participate in group discussion and activities regarding water cycle</li> <li>• Participate in pretending to be a water droplet and act out different parts of the water cycle</li> </ul>
<b>Assessment or Evaluation</b>	<ul style="list-style-type: none"> <li>• Observe student responses to questions during activities</li> <li>• Review the water cycle handout for completion, effort and understanding</li> </ul>
<b>Resources</b>	<p><a href="https://www.cdn.energyleaders.ca/sites/default/files/lessons/The%20water%20cycle%20lesson%20plan%20Grade%202-P2.pdf">https://www.cdn.energyleaders.ca/sites/default/files/lessons/The%20water%20cycle%20lesson%20plan%20Grade%202-P2.pdf</a></p> <p><a href="https://www.cdn.energyleaders.ca/sites/default/files/lessons/Gr2_Water%20cycle%20cutouts%20for%20students_0.pdf">https://www.cdn.energyleaders.ca/sites/default/files/lessons/Gr2_Water%20cycle%20cutouts%20for%20students_0.pdf</a></p> <p><a href="https://www.cdn.energyleaders.ca/sites/default/files/lessons/Gr2_Water%20cycle%20cut-outs%20for%20teachers.pdf">https://www.cdn.energyleaders.ca/sites/default/files/lessons/Gr2_Water%20cycle%20cut-outs%20for%20teachers.pdf</a></p> <p><a href="https://www.cdn.energyleaders.ca/sites/default/files/lessons/Gr2_Water%20CycleLesson-Graphic-web.pdf">https://www.cdn.energyleaders.ca/sites/default/files/lessons/Gr2_Water%20CycleLesson-Graphic-web.pdf</a></p> <p><a href="https://www.cdn.energyleaders.ca/sites/default/files/lessons/Gr2_Water%20cycle_SH_0.pdf">https://www.cdn.energyleaders.ca/sites/default/files/lessons/Gr2_Water%20cycle_SH_0.pdf</a></p>

<b>Lesson 4 - What is Energy?</b>	
<b>Lesson learning outcomes – Students will be able to:</b>	<ul style="list-style-type: none"> <li>• Access prior knowledge</li> <li>• Understanding energy</li> <li>• Energy makes things change and move</li> </ul>

<b>What will the teacher do?</b>	<ul style="list-style-type: none"> <li>• Ask guiding questions for mind map: “What is energy?” “How is energy part of your life?”</li> <li>• Facilitate group discussion on definitions of energy and write answers on chart paper</li> <li>• Coiling Snake Demo</li> </ul>
<b>What will the student do?</b>	<ul style="list-style-type: none"> <li>• Create a mind map of what they know about energy in a science journal</li> <li>• Discuss with class what they know and learn more about what energy is</li> <li>• Read a book called <i>Energy is Everywhere</i> or watch a video in groups</li> <li>• Use new colour in mind map to add anything new they learned about energy</li> </ul>
<b>Assessment or Evaluation</b>	<ul style="list-style-type: none"> <li>• Science journal mind map</li> </ul>
<b>Resources</b>	<a href="https://www.teachengineering.org/activities/view/cub_energy2_lesson01_activity1">https://www.teachengineering.org/activities/view/cub_energy2_lesson01_activity1</a>

<b>Lesson 5 - Solar Energy and Chemical Changes in Plants</b>	
<b>Lesson learning outcomes – Students will be able to:</b>	<ul style="list-style-type: none"> <li>• Access prior knowledge</li> <li>• Understanding what solar energy is</li> <li>• Create inquiry questions about plants and solar energy</li> </ul>
<b>What will the teacher do?</b>	<ul style="list-style-type: none"> <li>• Pre-activity: Watch the video “How Raven Stole the Sun” (Indigenous Story)</li> <li>• Take students somewhere in classroom or outside to feel the sun (students use imagination if it is not sunny)</li> <li>• Ask: “What do we feel when we are in the sun? Why? What do we see when we are in the sun? Why? What is solar energy?”</li> <li>• Evidence of Solar Energy Demo – two aluminum pans of water with thermometer, one left in the sun, one not, compare temperatures</li> <li>• Group discussion on what students know about sun and plants</li> <li>• Facilitates groups to create experiments growing seeds and plants from roots</li> <li>• Examples for experiments: plants in window light, away from window and in the closet</li> <li>• Make sure every student starts at least 3-4 scarlet runner beans in a Ziploc bag with wet paper towel for a later experiment</li> </ul>
<b>What will the student do?</b>	<ul style="list-style-type: none"> <li>• Engage in group discussions about solar energy</li> <li>• Work collaboratively in groups to create experiments with yams, carrots, and avocado seeds</li> </ul>

	<ul style="list-style-type: none"> <li>• Start scarlet runner beans in a Ziploc bag with wet paper towel</li> <li>• Create inquiry questions about different experiments in their science journal</li> </ul>
<b>Assessment or Evaluation</b>	<ul style="list-style-type: none"> <li>• Inquiry questions written in science journal</li> <li>• Photographs of students working in groups and individually to create experiments posted to FreshGrade</li> </ul>
<b>Resources</b>	<p>Video: “How Raven Stole the Sun”:  <a href="https://www.youtube.com/watch?v=rU7LVEilsxQ">https://www.youtube.com/watch?v=rU7LVEilsxQ</a> (You can access a better copy of this video by requesting it in the school district you are working in, along with puppets)</p> <p>Evidence of Solar Energy Demo:  <a href="http://www.teachengineering.org/activities/view/cub_energy2_lesson01_activity_1">www.teachengineering.org/activities/view/cub_energy2_lesson01_activity_1</a></p> <p>Sun Worksheet:  <a href="http://www.mrcollinson.ca/1%20science/energy/1_science_energy_sun.pdf">http://www.mrcollinson.ca/1%20science/energy/1_science_energy_sun.pdf</a></p> <p>Book: Adolph, J. (2018). <i>Mason Jar Science</i>. North Adams, MA: Storey Publishing.</p>

<b>Lesson 6 – Flow of Energy in Food Chains</b>	
<b>Lesson learning outcomes – Students will be able to:</b>	<ul style="list-style-type: none"> <li>• Make connections to solar energy and food</li> <li>• Understand when a living organism eats and changes is it a chemical change</li> <li>• Become familiar with the term “food chain”</li> <li>• Understand and example of a physical change would be weather effecting the environment; sun melting the glaciers</li> </ul>
<b>What will the teacher do?</b>	<ul style="list-style-type: none"> <li>• Access prior knowledge of food chains by asking “What do animals need to survive? Why do animals need other animals?”</li> <li>• Facilitate group discussion on food chains and food webs with connections to energy and the sun</li> <li>• Make connections to food chains with chemical change</li> <li>• Discuss what physical change would be in the environment</li> <li>• Give task to students to create an art project to represent a food chain or food web in the ocean or on land (see example in appendix)</li> <li>• Write criteria on board of expectations of drawing – must have a sun, five plants and five animals minimum</li> </ul>
<b>What will the student do?</b>	<ul style="list-style-type: none"> <li>• Engage in discussions of food chains</li> <li>• Create an art project representing a food chain either in the ocean on or land</li> <li>• Make observations of plant experiments from previous experiments</li> </ul>
<b>Assessment or Evaluation</b>	<ul style="list-style-type: none"> <li>• Finished art project that has five representations of plants and</li> </ul>

	<p>animals in a food chain, starting with the sun</p> <ul style="list-style-type: none"> <li>• Science journal entry</li> <li>• Photo documentation of art in progress or finished products posted to FreshGrade</li> </ul>
<b>Resources</b>	<p><a href="https://www.khanacademy.org/science/biology/ecology/intro-to-ecosystems/a/food-chains-food-webs">https://www.khanacademy.org/science/biology/ecology/intro-to-ecosystems/a/food-chains-food-webs</a></p> <p><a href="https://www.khanacademy.org/science/biology/ecology/intro-to-ecosystems/e/food-chains-and-food-webs">https://www.khanacademy.org/science/biology/ecology/intro-to-ecosystems/e/food-chains-and-food-webs</a></p> <p><a href="https://www.khanacademy.org/science/biology/ecology/intro-to-ecosystems/v/flow-of-energy-and-matter-through-ecosystems">https://www.khanacademy.org/science/biology/ecology/intro-to-ecosystems/v/flow-of-energy-and-matter-through-ecosystems</a></p> <p><a href="http://www.primaryhomeworkhelp.co.uk/foodchains.htm">http://www.primaryhomeworkhelp.co.uk/foodchains.htm</a></p> <p><a href="https://betterlesson.com/lesson/629399/food-chains">https://betterlesson.com/lesson/629399/food-chains</a></p> <p><a href="http://www.saburchill.com/chapters/chap0006.html">http://www.saburchill.com/chapters/chap0006.html</a></p> <p><a href="http://www.qrg.northwestern.edu/projects/marssim/simhtml/info/whats-a-carnivore.html">http://www.qrg.northwestern.edu/projects/marssim/simhtml/info/whats-a-carnivore.html</a></p>

<b>Lesson 7 – Worm Composter</b>	
<b>Lesson learning outcomes – Students will be able to:</b>	<ul style="list-style-type: none"> <li>• To understand how matter recycles through and ecosystem</li> <li>• To gain an understanding of decomposition and critical role decomposers play in the food web and the cycling of matter</li> <li>• Make their own worm composter in a mason jar</li> <li>• Make observations and predictions</li> </ul>
<b>What will the teacher do?</b>	<ul style="list-style-type: none"> <li>• Ask students what they know about composting</li> <li>• Read The Three ‘R’s in the Forest - Guided Imagery about a tree that decomposes</li> <li>• Support students to create their own worm composter</li> </ul>
<b>What will the student do?</b>	<ul style="list-style-type: none"> <li>• Create their own worm composter in a mason jar</li> <li>• Make predictions and observation</li> <li>• Make observations of plant experiments from previous experiments</li> <li>• Take care of the worm composter by keeping it moist over the next few weeks</li> </ul>
<b>Assessment or Evaluation Assessment or Evaluation</b>	<ul style="list-style-type: none"> <li>• Draw predictions and observations of the worm composter on a graphic and glue into science journal</li> </ul>
<b>Resources</b>	<p>Book: Adolph, J. (2018). <i>Mason Jar Science</i>. North Adams, MA: Storey Publishing.</p> <p><a href="https://teachbcdb.bctf.ca/list?q=+the+3+r%27s&amp;p=1&amp;ps=25">https://teachbcdb.bctf.ca/list?q=+the+3+r%27s&amp;p=1&amp;ps=25</a></p>

	<p>The Three ‘R’s in the Forest - Guided Imagery:  <a href="https://www.hctfeducation.ca/wp-content/uploads/2014/09/ThreeRsinForest_GuidedImagery_CopyPage.pdf">https://www.hctfeducation.ca/wp-content/uploads/2014/09/ThreeRsinForest_GuidedImagery_CopyPage.pdf</a></p> <p>Lesson Ideas:  <a href="https://www.hctfeducation.ca/wp-content/uploads/2014/09/ThreeRsinForest_Lesson.pdf">https://www.hctfeducation.ca/wp-content/uploads/2014/09/ThreeRsinForest_Lesson.pdf</a></p> <p>Extension ideas:</p> <p>The Three R’s of the Forest - Detective Sheet:  <a href="https://www.hctfeducation.ca/wp-content/uploads/2014/09/ThreeRsinForest_DetectiveSheet_CopyPage.pdf">https://www.hctfeducation.ca/wp-content/uploads/2014/09/ThreeRsinForest_DetectiveSheet_CopyPage.pdf</a></p> <p>Ecosystem Primer:  <a href="https://www.hctfeducation.ca/wp-content/uploads/2016/08/Ecosystems_Primer.pdf">https://www.hctfeducation.ca/wp-content/uploads/2016/08/Ecosystems_Primer.pdf</a></p> <p>Learning about Forest Trees and Animals:  <a href="https://www.hctfeducation.ca/wp-content/uploads/2014/09/ForestStories_Lesson.pdf">https://www.hctfeducation.ca/wp-content/uploads/2014/09/ForestStories_Lesson.pdf</a></p> <p><a href="https://www.hctfeducation.ca/lessons/earth-ecosystems-and-ecology/">https://www.hctfeducation.ca/lessons/earth-ecosystems-and-ecology/</a></p>
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<b>Lesson 8 – Plants and Chemical Changes</b>	
<b>Lesson learning outcomes – Students will be able to:</b>	<ul style="list-style-type: none"> <li>• Ask questions and create experiments regarding how bean plants grow and react to light</li> </ul>
<b>What will the teacher do?</b>	<ul style="list-style-type: none"> <li>• Ask students what they know about how plants react to light</li> <li>• Discuss possible ideas for experiments</li> <li>• Have materials ready and suggestions of what the students could do; each student should have at least two plastic pots available for at least two experiments</li> </ul>
<b>What will the student do?</b>	<ul style="list-style-type: none"> <li>• Observe small bean plants and create experiments planting small plants into dirt in different scenarios (examples: in a box with a hole for light, placed in the closet, in the window, in a shaded area in the classroom, or tipped over in the pot)</li> </ul>
<b>Assessment or Evaluation</b>	<ul style="list-style-type: none"> <li>• Write down what they did and their predictions in their journal</li> <li>• Photo document students creating composters and post to FreshGrade</li> </ul>

<b>Lesson 9 – Lava Lamps and Yeast Balloon Experiments</b>	
<b>Lesson learning outcomes – Students</b>	<ul style="list-style-type: none"> <li>• Create a lava lamp in pairs</li> <li>• Observe how yeast reacts with sugar</li> </ul>



<b>will be able to:</b>	<ul style="list-style-type: none"> <li>• Understand the concept of 140 000 000 000 yeast cells</li> <li>• Explain whether or not the reactions are a physical or chemical</li> </ul>
<b>What will the teacher do?</b>	<ul style="list-style-type: none"> <li>• Provide materials and instructions on how to make lava lamps and yeast balloon experiments</li> <li>• Group discussion afterwards</li> </ul>
<b>What will the student do?</b>	<ul style="list-style-type: none"> <li>• Create and observe lava lamps with predictions before and after experiment</li> <li>• Create and observe yeast balloon experiments</li> <li>• Write and/or draw predictions and observations in graphic to glue in science journal of lava lamp and yeast experiment</li> </ul>
<b>Assessment or Evaluation</b>	<ul style="list-style-type: none"> <li>• Graphic for science journal – did the student understand these reactions were chemical?</li> <li>• Photo documentation for FreshGrade</li> </ul>
<b>Resource</b>	Book: Adolph, J. (2018). <i>Mason Jar Science</i> . North Adams, MA: Storey Publishing.

<b>Lesson 10 – The Physics of Bubbles</b>	
<b>Lesson learning outcomes – Students will be able to:</b>	<ul style="list-style-type: none"> <li>• Demonstrate and observe how gas is matter that takes up space</li> <li>• How blowing air into a soapy chemical mixture can change the look of the liquid, doesn't change physical property of the soapy mixture</li> </ul>
<b>What will the teacher do?</b>	<ul style="list-style-type: none"> <li>• Provide materials for experiment to make bubbles</li> <li>• Ask the students questions about what they think they are going to make with the ingredients provided</li> <li>• Ask: “What is matter? What are the states of matter?” (Review from previous lesson)</li> <li>• Support a few students to mix together recipe to make bubble mixture (chemical change)</li> <li>• Let students experiment with blowing up bubbles with long straws on the tables</li> <li>• Tips: put mixture on table prior to blowing bubbles on table and bubbles last longer, bubbles can be blown inside other bubbles</li> <li>• The bigger the bubble the bigger your lung capacity; shows how much air you can hold in your lungs</li> <li>• Teacher will put some prompts on the board students can start with when writing in their journal such as, “My favourite thing I did today was... I learned that bubbles can show... I learned that air is a gas that is matter and takes up space because...”</li> </ul>
<b>What will the student do?</b>	<ul style="list-style-type: none"> <li>• Actively participate in discussions and bubble experiments</li> <li>• Write in their science journal what they learned</li> </ul>
<b>Safety concerns</b>	<ul style="list-style-type: none"> <li>• Must wear safety goggles and have gloves available</li> </ul>
<b>Assessment or</b>	<ul style="list-style-type: none"> <li>• Photo documentation or videos of bubble experiments uploaded to</li> </ul>

<b>Evaluation</b>	FreshGrade
<b>Assessment or Evaluation</b>	<ul style="list-style-type: none"> <li>• Ask students in a video what they learned and upload to FreshGrade</li> <li>• Science journal</li> </ul>
<b>Resource</b>	John Titanic and Ruth Esteves Lesson Plan: Exploring Bubbles and Mass

<b>Lesson 11 – Making Dry Ice Bubbles (Boo Bubbles)</b>	
<b>Lesson learning outcomes – Students will be able to:</b>	<ul style="list-style-type: none"> <li>• See the chemical reaction of dry ice in hot water</li> <li>• Observe how gas is matter and takes up space</li> <li>• Observe how matter can change (sublimate) from a solid to a gas</li> </ul>
<b>What will the teacher do?</b>	<ul style="list-style-type: none"> <li>• Review how matter can change states</li> <li>• Discuss and access prior knowledge students have of dry ice</li> <li>• Provide a demonstration that shows how dry ice sublimates in hot/warm water and how it can be contained in bubbles (the hotter the water, the faster the dry ice sublimates)</li> <li>• For a special effect – put a waterproof flashlight in the bottom of the bowl with the hot/warm water and dry ice with the lights off!!</li> </ul>
<b>What will the student do?</b>	<ul style="list-style-type: none"> <li>• Discuss, predict and observe sublimation of dry ice in hot/warm water</li> <li>• Hold bubbles with dry ice with gloves</li> <li>• Write or draw their experiences in their science journal</li> </ul>
<b>Safety concerns</b>	<ul style="list-style-type: none"> <li>• Anyone close by must wear safety goggles and anyone touching bubbles should wear gloves; teacher is the only one who should touch the dry ice using gloves</li> </ul>
<b>Assessment or Evaluation</b>	<ul style="list-style-type: none"> <li>• Photo documentation or videos of bubble experiments uploaded to FreshGrade</li> <li>• Ask students in a video what they learned and upload to FreshGrade</li> <li>• Review science notebook</li> </ul>
<b>Resource</b>	John Titanic and Ruth Esteves Lesson Plan: Exploring Bubbles and Mass

<b>Lesson 12 – Observing Changes in Plants and How They React to the Light</b>	
<b>Lesson learning outcomes – Students will be able to:</b>	<ul style="list-style-type: none"> <li>• Will have an understanding of how light energy impacts plants and that growth represents chemical changes</li> </ul>

<b>What will the teacher do?</b>	<ul style="list-style-type: none"> <li>• Facilitate group discussion about how solar energy (light) impacts plants</li> </ul>
<b>What will the student do?</b>	<ul style="list-style-type: none"> <li>• Observe what happened to plants and why</li> <li>• Readjust the experiments to make new predictions</li> <li>• Share with the class their findings</li> </ul>
<b>Assessment or Evaluation</b>	<ul style="list-style-type: none"> <li>• Observations and thoughts in science journal</li> <li>• Rubric</li> </ul>
<b>Resource</b>	Worksheet for documenting observations of plants: <a href="http://www.mrcollinson.ca/1%20science/energy/1_science_energy_plan_t_book.pdf">http://www.mrcollinson.ca/1%20science/energy/1_science_energy_plan_t_book.pdf</a>

<b>Lesson # 6</b>	<b>Grade 2</b>
<b>Flow of Energy in Food Chains</b>	
<b>Lesson Overview</b>	
<p>Students share what they know about food chains and food webs. They will explore what food chains and webs are with a class discussion. To keep with the theme of this unit, students will understand how food chains represent chemical changes of energy which all begin with the energy of the sun. Students will briefly discuss physical changes on the earth in ecosystems with the impact of weather, such as the sun melting the glaciers. The lesson will end with an art project that represents the student's interpretation of a food chain or food web, including at least five ideas that connect together.</p>	
<b>Lesson learning outcomes – Students will be able to...</b>	
<ul style="list-style-type: none"> <li>• Make connections to solar energy and food</li> <li>• Understand when a living organism eats and changes is it a chemical change</li> <li>• Become familiar with the words “food chain” and “food web”</li> <li>• Understand and example of a physical change would be weather effecting the environment; sun melting the glaciers</li> </ul>	
<b>Materials</b>	
<ul style="list-style-type: none"> <li>• Access to digital projector and video</li> <li>• Chalk board and chalk</li> <li>• Art paper – cut to approx 7 x 11</li> <li>• Fine tip black sharpie</li> <li>• Markers, pencil crayons or watercolour pencil crayons</li> <li>• Reference books, print outs and images found online for drawing sea creatures and seaweed</li> </ul>	
<b>Preparation</b>	
<ul style="list-style-type: none"> <li>• Review terms, food chains and food webs, physical change examples in the environment</li> <li>• Practice drawing and colouring sun, seaweed and sea creatures</li> <li>• If you have time prior to this lesson, get the students to practice drawing sea creatures Prepare art materials <ul style="list-style-type: none"> <li>○ Prep paper and cut to size making sure to have enough for all students with a few</li> </ul> </li> </ul>	

extra

- Make sure you have enough fine tip sharpies and pencil crayons etc
- Make sure the paper you prepare doesn't bleed with the fine tip black markers

## Lesson Notes

A **food chain** is a linear description of how energy and nutrients are passed from one organism to another by eating (consumption). Every living thing needs energy to survive. In order for living organisms to get energy they need to eat food. Plants use sunlight, nutrients and water to get energy. Animals use water and need to eat either meat and or plants for food. A food chain explains how nutrients and energy are passed starting with plants and ending up with animals who at the top of the food chain.

**Food webs** are food chains that more realistically represent how animals eat other animals. It isn't necessarily a linear sequence.

**Photosynthesis** is how green plants make/produce food from the energy of the sun.

**Producers** are organisms which are either green plants or bacterium that are in the first level of the food chain. The green in the leaves of plants help plants make energy from the sun to make food.

**Consumers (or heterotrophs)** are the animals in a food chain. Animals are not able to make their own food. Animals get energy by eating other organisms, either plants or other animals.

**Herbivore** is an animal that gets its energy from eating plants only.

**Carnivore** is an animal that eats other animals. They eat mostly herbivores, but they do eat omnivores.

**Omnivore** is an animal that eats other animals and plants.

**Predators** are animals at the top of a food chain and prey on other animals.

## Lesson Activities

### Activity 1: Discussion about the Flow of Energy in Food Chains (10 min)

Start a discussion with these key questions to the students:

- What do animals need to survive?
- Why do animals need other animals?
- Why is the sun important for animal's survival?
- Do you know what a food chain is? Do you know what a food web is?

Explain what a food chain is and what a food web is with examples. Draw an example of food chain on the board in the ocean starting with the sun. Ask the students;

- Can you think of an example of a food chain? Write students answers on the board or get them to write their answers.

Facilitate a group discussion on food chains and food webs with connections to energy and the sun.

- Does the food chain represent chemical changes or physical changes of energy? (chemical)
- Can you think of a way the energy of the sun affects the earth causing a physical change in the environment? (Glaciers melting, weather patterns causing wind, evaporation of the ocean, etc)

### **Activity 2: Look Ways of Drawing Different Marine Plants and Animals (10 min)**

- Review some books with reference images of seaweed, small fish, larger fish and a predator
- Explain that the smaller the fish or creature, the more of them there are and that it is likely that there would only be one of the largest predators in the image
- Discuss what students would like to put in their image
- Demonstrate different ways to draw seaweed, fish, eels, and or sharks depending on what the students are interested in and the comfort level the teacher has in drawing
- Show the students how it is important to start with the sun first, then seaweed, then the small fish and move up the food chain as they draw
- A great book for learning how to draw fish and seaweed is *How to Draw Ink Wonderlands* by Johanna Basford

### **Activity 3: Students Draw a Food Chain or Food Web (30 min)**

- Ask students to write their name on the back of their paper with pencil
- Students put their pencil away
- Remind students to start with the sun and ocean line first
- Next draw seaweed or fish, starting with the smallest fish, then the larger fish or sea creatures, and a big predator to finish; *if students want the fish to be in front of the seaweed, they must draw the fish first*
- Remind students that parts of the fish, seaweed or sea creatures can be off the page, especially if it is a big predator that might not all fit
- None of the sea creatures, fish or seaweed have to be drawn realistically
- Criteria of drawing: must have a sun, 5 drawings of plants and 5 drawings of animals representing the food chain levels (*co-criteria could be established here with the students beforehand*)
- Ask students to begin their drawing of a food chain or web in the ocean with fine tip black sharpies (see example in appendix)
- *Do not let students use a pencil as they may spend more time erasing and trying to get their drawing perfect - we are not striving for perfection, it is more about the process*
- Encourage students to turn mistakes into something else
- Only give out a new piece of paper as a last resort
- Depending on the time and what the teacher decides students can finish by colouring in animals and the sun; it is not necessary to colour the background of the sky or ocean – students could use pencil crayon, markers or watercolour pencil crayons
- *We may need extra time to finish drawing another day depending on how the lesson goes*

### **Assessment**

- Rubric for finished art project that meets the criteria of five representations of plants and animals in a food chain, starting with the sun – see appendix
- Science journal entry
- Photo documentation of art in progress or finished products posted to FreshGrade

## Resources:

<https://www.khanacademy.org/science/biology/ecology/intro-to-ecosystems/a/food-chains-food-webs>

<https://www.khanacademy.org/science/biology/ecology/intro-to-ecosystems/e/food-chains-and-food-webs>

<https://www.khanacademy.org/science/biology/ecology/intro-to-ecosystems/v/flow-of-energy-and-matter-through-ecosystems>

<http://www.primaryhomeworkhelp.co.uk/foodchains.htm>

<https://betterlesson.com/lesson/629399/food-chains>

<http://www.saburchill.com/chapters/chap0006.html>

<http://www.qrg.northwestern.edu/projects/marssim/simhtml/info/whats-a-carnivore.html>

Carnivore information:

<http://www.qrg.northwestern.edu/projects/marssim/simhtml/info/whats-a-carnivore.html>

Herbivore information:

<http://www.qrg.northwestern.edu/projects/marssim/simhtml/info/whats-a-herbivore.html>

Omnivore information:

<http://www.qrg.northwestern.edu/projects/marssim/simhtml/info/whats-an-omnivore.html>

Other Ideas:

[http://www.mrcollinson.ca/1%20science/energy/1 science energy chains.pdf](http://www.mrcollinson.ca/1%20science/energy/1%20science%20energy%20chains.pdf)

<https://www.superteacherworksheets.com/food-chain.html>

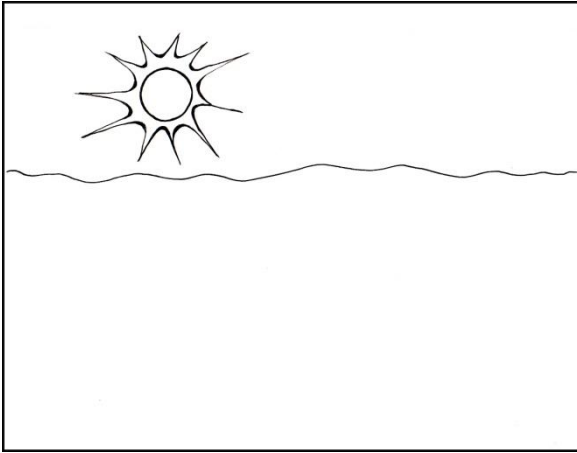
[http://www.mrcollinson.ca/1%20science/energy/1 science energy complete.htm](http://www.mrcollinson.ca/1%20science/energy/1%20science%20energy%20complete.htm)

## Appendix:

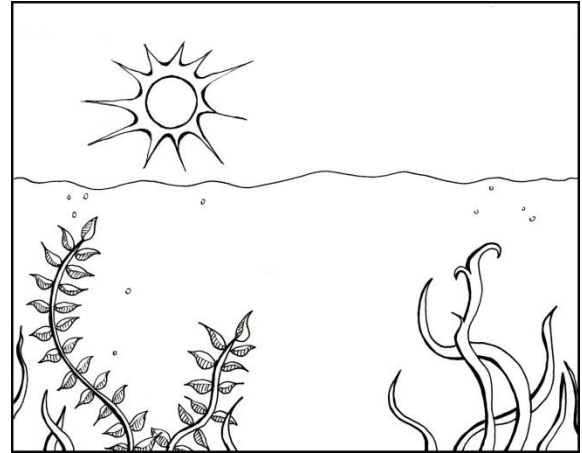
**I. Samples of Food Chain or Food Web Ocean Drawing**

**II. Rubric**

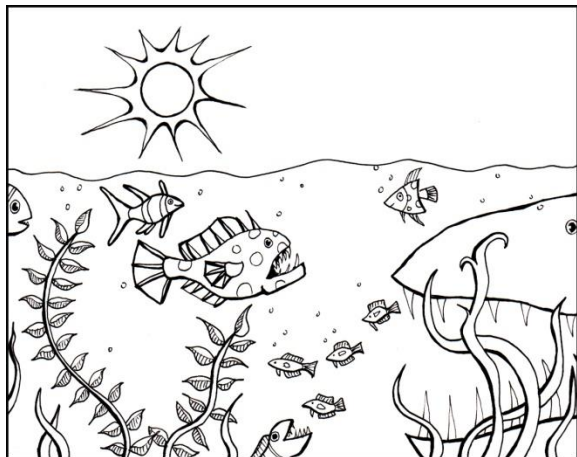
## Samples of Food Chain or Food Web Ocean Drawing



- Draw the sun first, use a circle template if you have one.
- Measure a point on both sides of the paper for the ocean line with pencil before drawing to make sure the ocean is level.
- Draw the ocean line.



- Draw the objects you want in the front first.
- If you want fish in behind seaweed, draw the seaweed first.
- If you want Fish in front of the seaweed, draw the fish first.



- Draw the rest of the image making sure to include seaweed, small fish, medium sized fish or creatures and one large predator.
- Fish can be imaginary and do not have to be realistic.



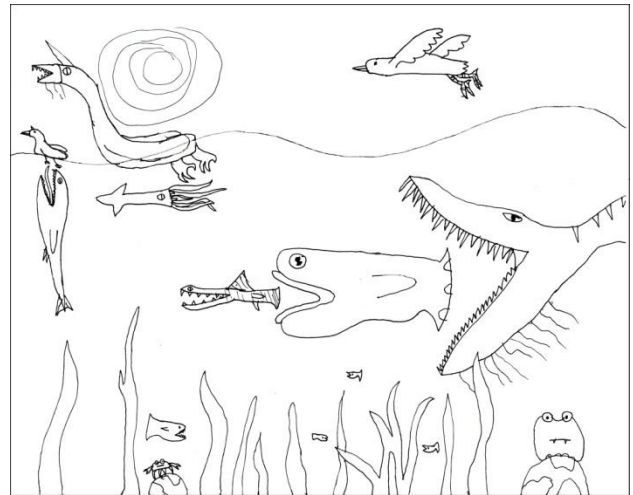
- It is not necessary to colour but students can use pencil crayon, watercolour pencil crayon or markers.
- *A better option might be to just colour the sun, the seaweed, and the sea creatures to better illustrate the food chain or food web.*
- If colouring the ocean, make sure to use a blue that you do not use in any fish or seaweed so that the fish and seaweed don't get lost into the background colour.



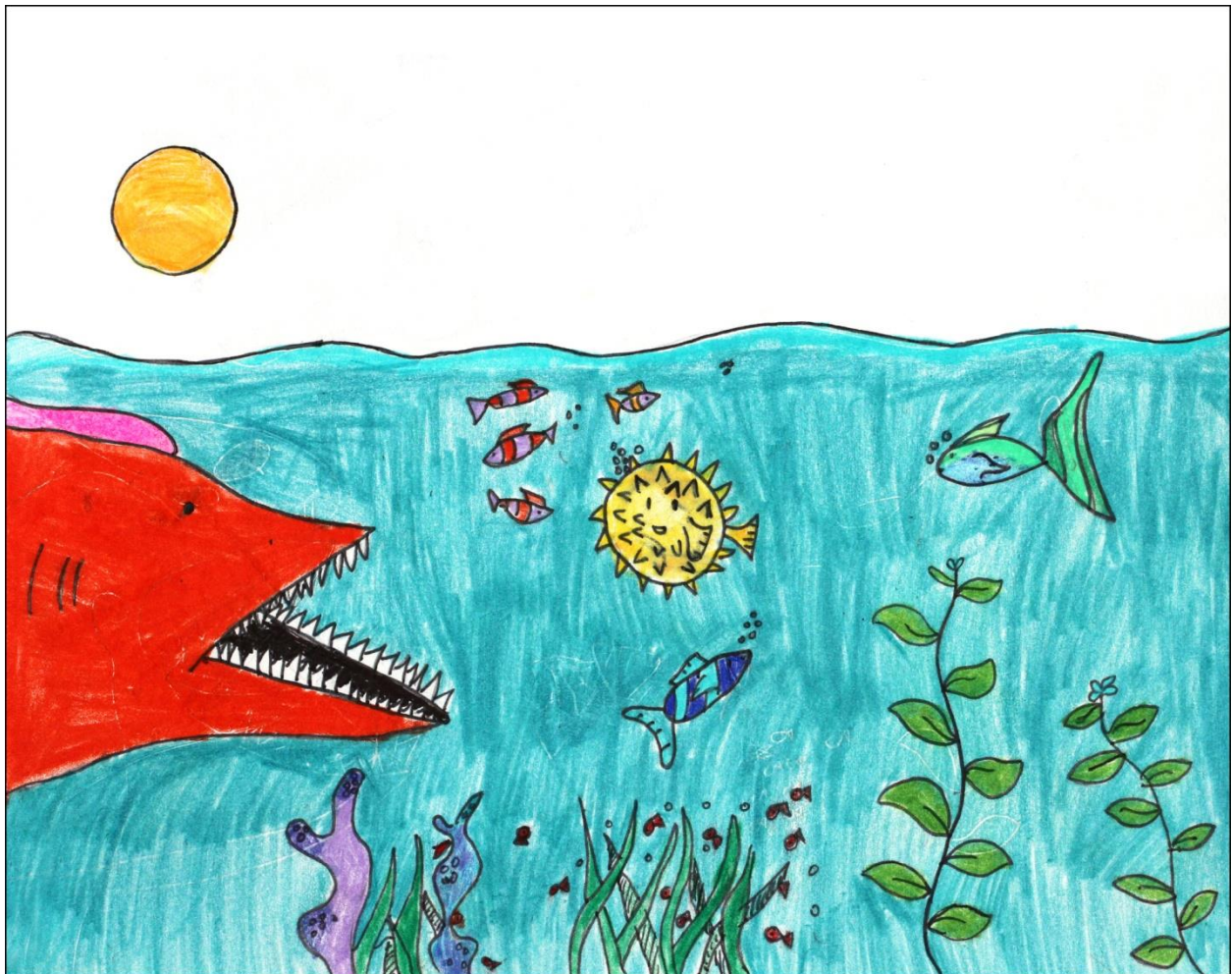
Other samples:



Thomas 14 years old






Thomas 14 years old



Norah 11 years old



### Rubric for Food Chain Ocean Drawing

			
<b>Techniques and Materials</b>	Student clearly understands how to use materials used in demonstration.	Student has a good understanding of how to use materials presented in demonstration.	Student is starting to discover and understand how to use materials presented in demonstration.
<b>Connections</b>	Student clearly understands the basic concepts of a food chain starting with the energy of the sun.	Student understands how to represent a food chain.	Student is starting to discover what a food chain is.
<b>Creativity</b>	Student is going beyond the demonstration and is exploring their own creative ideas.	Student is showing creativity in their work by exploring the ideas presented in the demonstration.	Student is starting to explore the ideas presented in the demonstration.
<b>Completion</b>	Student has included the sun, 5 or more plants, 5 or more animals in their drawing of the food chain and has taken the time to colour the image.	Student completed the sun, 5 animals and 5 plants in their drawing of the food chain in the ocean.	Student is working towards completing the sun, 5 animals and 5 plants of the food chain in the ocean.