

## LCM Informal Loop

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| <p><b>LCM Lesson Plan: Break it up-Move it out</b></p> <p><b>Standards:</b><br/>SC: A7, B1, LA: A2, Cultural: E4</p> <p><b>Time:</b> 3 fifty-minute, class periods</p> <p><b>Science concept:</b><br/>Learn about forces that cause the earth's surface to change by investigating three agents of physical weathering</p>   | <p><b>Name</b><br/>Donald Eldridge</p> <p><b>Grade level</b><br/>5/6th</p> <p><b>School</b><br/>Hogarth Kingeekuk Memorial</p> |   |
| <p><b>Gear- Up</b></p> <p>Prepare to create a concept map or a list of ideas. Ask the students how many of them have ever seen a can of soda after being left in the freezer too long. Have them explain what happens. How might that force be used to break rocks? Next, ask the students what natural forces transport dirt, rocks and pebbles from one place to the other? How does the process affect the physical surroundings? (It is important to listen to their responses but not to correct them or interject answers.) Finally, ask students what is stronger a castle wall or a tree? Inform the students that for the next three days they will be exploring the phenomenon of <i>Weathering and Erosion</i>, the forces that create soils, carve hills and valleys, fill the beaches with sand, and tear down castle walls.</p>  | <p><b>Processes:</b></p> <p>Inferring<br/>Communicating<br/>Developing theories</p>  | <p><b>Materials/team of 2</b></p> <p>1 Science journal each<br/>Access to a freezer<br/>2 plastic condiment cups with lids<br/>1 roll masking tape<br/>35 lima bean seeds<br/>Magnifier<br/>2 rocks – sandstone<br/>2 rocks – shale<br/>2 rocks – local<br/>1 sample of sand<br/>1 sample of clay<br/>Dark construction paper<br/>Visual representation of weathering- Grand Canyon</p> |
| <p><b>Explore</b></p> <p><b>DAY 1</b></p> <ol style="list-style-type: none"> <li>1) Students will work in pairs to fill one condiment cup to the top with water and tape a plastic lid into place. Next, fill a 2<sup>n</sup> cup up to the top with 35 bean seeds and water then securely tape its lid into place also.</li> <li>2) Students will draw the two cups in their journals and predict what will happen to each overnight when the cup with just water is placed in the freezer and the cup with bean seeds is placed in a cool place.</li> <li>3) Next, students will explore mechanical weathering by examining sandstone, shale, and local rocks with a hand lens or magnifier. (If sandstone and shale samples are not available just use local rocks but test to find samples that make sand or dust when rubbed together).</li> <li>4) Describe appearance and texture of each type of stone in journals</li> <li>5) Rub two shale stones together over dark construction paper. Use your magnifier to examine the particles. Feel the particles; are they rough or smooth, coarse or fine? Record the observations and repeat process with other stones.</li> </ol> | <p><b>Processes:</b></p> <p>Observing<br/>Classifying<br/>Inferring<br/>Communicating</p>                                      | <p>If possible: Earth Science in Action<br/><i>Weathering and Erosion</i><br/>By Schlessinger Library<br/>Is a wonderful visual aid that tie all of these concepts together</p>   |

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| <p><b>Explore</b><br/><b>DAY 2</b></p> <ol style="list-style-type: none"> <li>1) Allow the time to finish any explorations left over from the previous day. Compare all the samples. What differences did they notice? What kinds of materials do they think make up the different stones</li> <li>2) If possible, have students compare clay to sand. Do you think these two products of weathering could have come from the same kind of rock? Why or why not?</li> <li>3) Next, students will retrieve their cupped samples of frozen water and bean seeds and water; examine the two cups and draw a picture of each in their journals. Students will record their observations of what happened to the seeds and what happened to the cups, students compare results to their predictions. Did predictions come true? Why or why not?</li> </ol>   |  |  |
| <p><b>Generalize:</b><br/><b>DAY 3</b></p> <p>Ask the students: what happened to the frozen water? What happened to the seeds? What happened to the cups? What kind of situations in nature would create the same kind of results (trees growing along a cliff or under sidewalk, water in the cracks of a stone, etc.)? What happens when stones rub against each other? Return to the concept map, ask the students if they would like to change or add anything</p> <p>Show the students pictures (Great time for a power point) of the Grand Canyon, sand dunes, beaches, glaciers, the Missouri Breaks and any other visual representation of physical weathering you can find. (Pictures of abandoned temples and cities in Asian jungles make a great visual representation of plant vs. rock). Ask them to think about and identify what natural forces worked together to transport and break rocks into smaller pieces, round and smooth boulders create sand and carve such natural wonders as represented in the pictures. End presentation with short lecture about physical weathering, transport, and deposition</p> | <p><b>Processes:</b><br/>Observing<br/>Inferring<br/>Communicating</p> | <p><b>Vocabulary</b><br/>Weathering<br/>Mechanical weathering<br/>Expansion<br/>Transport<br/>Deposition<br/>Physical weathering</p> |
| <p><b>Apply/Assess</b></p> <p>Students must answer the following questions with complete sentences:</p> <ol style="list-style-type: none"> <li>1) What example of physical weathering do you see happening in your local area?</li> <li>2) What agent or force is causing this weathering to happen?</li> </ol>   | <p><b>Processes:</b><br/>Inferring<br/>Communicating</p>               |  |

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| <p><b>Apply/Access</b></p> <ol style="list-style-type: none"> <li>3) What is happening to the broken pieces?</li> <li>4) What conditions maximize this type of weathering?</li> <li>5) Can you think of another example of weathering and describe it?</li> </ol> <p>Students must report their findings by combining the above information into a paragraph.</p>                              |  |  |
| <p>Extensions:</p> <ul style="list-style-type: none"> <li>• Create and hand out a study guide for terminology</li> <li>• Students can write Haiku poetry about weathering.</li> <li>• Explore the cause/effects of chemical weathering.</li> <li>• Return to the concept map and create an <i>Interrelationship Diagraph</i> to examine the dominant causes of physical weathering.</li> </ul> |  |  |

## Break it Up-Move it Out: LCM Scoring Guide

|                        | Emerging   | Developing   | Proficient   | Advanced   |
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| <b>Prediction</b>      | Makes no prediction and proceeds with the exploration              | Makes some attempt but shows no connection to the concept  | Prediction is logical but no attempt is made to physically draw the perceived changes  | Prediction is logical and artistic rendering is present in journal   |
| <b>Explore</b>         | Does not follow instructions or work with partner to achieve tasks | Shows some interest in topic but is unable to stay on task | Follows instructions, works with partner, some evidence of science concept is apparent in journal  | Is motivated to explore the science concept. Works well with partner, generates questions on topic, stays on task                          |
| <b>Data Collection</b> | Does not gather relevant information                               | Data is incomplete, does not reflect observations          | Written data is complete and reflects honest effort. Some attempt at artistic detailing has been made.   | Written data is complete and accurate. Artistic journaling is detailed and shows appreciation for detail and pride in craftsmanship        |
| <b>Communication</b>   | Does not answer assessment questions                               | Attempts to answer questions                               | Answers questions in complete sentences and attempts to put information into a paragraph. Makes between 3-5 mistakes with spelling and conventions | Answers questions in complete sentences. Puts information into a proper paragraph. Makes less than 3 mistakes with convention and spelling |