

<b>Lesson Update and CRT Addendum</b>	
<b>Lesson/Activity Title: Packing Up for the Moon</b>	<b>ID: 1-94</b>
<b>Product Number: EP-2007-08-93-MSFC</b>	<b>Grade: MS</b>
<b>URL for Lesson:</b> <a href="http://lroc.sese.asu.edu/files/EducatorGuides/PackingupforMoon1Guide.pdf">http://lroc.sese.asu.edu/files/EducatorGuides/PackingupforMoon1Guide.pdf</a>	
<b>Subject: Plant growth, photosynthesis, transpiration, cellular respiration, energy transformation, comparison of Earth and moon, role of plants in ecosystems</b>	
<b>Summary: Students will explore the role of plants in ecosystems, determine the biological requirements for plant growth, and discover the conversion of matter and energy through natural processes. Students will also use mathematical concepts (ratios and percentages) to compare and contrast the Earth and its moon.</b>	
<b>Materials for lesson: No extensive materials beyond common classroom technology.</b>	

<b>Review and Recommendations</b>	
<b>ALIGNMENT TO STANDARDS</b>	
<b>NGSS</b>	<b>MS-LS1-6, MS-LS1-7, MS-LS2-1, MS-LS2-2, MS-LS2-3, MS-LS-4, MS-LS2-5, MS-ESS1-3</b>
<b>Common Core State Standards in Mathematics</b>	<b>6. RP, 7.RP</b>
<b>CULTURAL RESPONSIVE TEACHING (CRT) RECOMMENDATIONS</b>	
<b>5E Lesson/Description</b>	
<b>1. Engage</b>	-Tease with NASA slamming LCROSS into Cabeus crater in 2009. Why? What could that have to do with growing plants on the moon? (see link in Additional Resources)
<b>2. Explore</b>	Teacher could let students survey local area and determine types of plants their family uses (food, medicine..).
<b>3. Explain</b>	Teacher can facilitate a discussion of which milestones have been reached and which have not yet, including the possibility of students' future participation in achieving those goals.

<p><b>4. Expand/Enhance</b></p>	<p>Lesson could be taught in collaboration with social studies lesson on original moon landing. Cultures that favor plant-based diet could be explored in greater depth.</p> <p>In urban areas, parallels could be drawn to growing plants/food in containers/patios/greenhouses/other urban spaces where lack of access to soil/water and temperature must be considered.</p> <p>Students could do this lesson as a wrap up for an ecosystem unit. Students could build a model of the Lunar Base that includes all of the things they have just learned are required in an ecosystem as a hands on summative assessment. The assessment itself could be as simple as a gallery walk or the student creations could be modular and put together into a large lunar “village” that gets presented to the school or parents.</p>
<p><b>5. Evaluate</b></p>	<ul style="list-style-type: none"> <li>-Students can build scale models of Lunar Base Plant Growth Chamber using available materials.</li> <li>-Students could share their family or culture’s experience with growing plants for food/medicine and relate that positively or negatively to recreation of the same model in a lunar environment.</li> </ul>

**Additional Resources:**

[www.nasa.gov/mission\\_pages/LCROSS/main/prelim\\_water\\_results.html](http://www.nasa.gov/mission_pages/LCROSS/main/prelim_water_results.html)

<http://www.nasa.gov/topics/moonmars/features/moon20090924.html>

<http://www.cnbc.com/2016/08/03/moon-express-and-the-trillion-dollar-race-to-harvest-the-moon.html>

<http://sservi.nasa.gov/articles/nasa-looking-to-mine-water-on-the-moon-and-mars/>

[http://sservi.nasa.gov/wp-content/uploads/2015/11/Pendleton\\_IAU.pdf](http://sservi.nasa.gov/wp-content/uploads/2015/11/Pendleton_IAU.pdf)