

PROJECT DESIGN: OVERVIEW

page 1

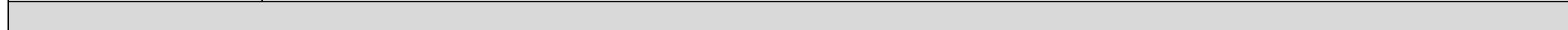
Name of Project: Colonizing the Moon		Duration: 6 Weeks	
Subject/Course: Engineering/Science		Teacher(s): Wilson; 3rd Grade Team	Grade Level: 3rd
Other subject areas to be included, if any: Writing, Math, Speaking and Listening			
Key Knowledge and Understanding (CCSS or other standards)	W 3.2; W 3.8; SL 3.4; 3-5-ETS1-1; 3-5-ETS1-3; MP.2; MP.5; 3.MD.B.3; 3.MD.B.4		
Success Skills (to be taught and assessed)	Critical Thinking/Problem Solving	✓	Self-Management
	Collaboration	✓	Other: Creativity
Project Summary (include student role, issue, problem or challenge, action taken, and purpose/beneficiary)	As pioneers, engineers, and explorers, students will be designing and engineering prototypes that will help them meet their basic needs for survival on the moon. They will create solar ovens, solar water heaters, and lunar plant chambers to meet their needs for heat, food, and air. Additionally, they will write information pieces on colonization of the moon, and will present their findings and creations to an adult audience of parents and administration.		
Driving Question	How can we, as the first lunar colonists and structural engineers, meet our basic needs for survival on the moon?		
Entry Event	https://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=10515 (Video on living on the moon). *Interview with Boeing Engineer who designed part of the International Space Station, Amy Guder		
Products	Individual: *Information Writing: Living on the Moon *Science Notebooks with data from each challenge & info. from learning about the moon.	Specific content and competencies to be assessed: W.3.2: Write informative/explanatory pieces to examine a topic & convey ideas & info. Clearly W.3.8: Gather info. From print & digital sources; take notes and sort evidence.	

	<p>Team: *Solar Oven *Solar Hot Water Heater *Lunar Plant Growth Chamber *Ozobot Obstacle Course</p>	<p>Specific content and competencies to be assessed: 3-5-ETS1-1: Define a simple design problem reflecting a need or want that includes specified criteria & constraints on materials, time, and cost. 3-5-ETS1-2: Generate & Compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.</p>
--	---	---



PROJECT DESIGN: OVERVIEW	page 2
---------------------------------	--------

<p>Making Products Public (include how the products will be made public and who students will engage with during/at end of project)</p>	<p>Parents, other students, and administrators will be invited to a lunar colonization celebration in which they will display solar ovens, solar hot water heaters, lunar plant growth chambers, Ozobot courses, and information writing on surviving on the moon. Students will each present one aspect of the project.</p>
---	--



<p>Resources Needed</p>	<p>On-site people, facilities: Boeing Engineer, Amy Guder; a botonist</p>
	<p>Equipment: Smartboard, iPads, teacher computer</p>
	<p>Materials: thermometers, stopwatches, cardboard pizza boxes, plastic wrap/plexiglass, S'mores fixin's, aluminum foil, black construction paper, tape, plants, paper cups, plastic tubing (1/4 in./6mm), pitcher of H2O, rulers, scissors, straws, duct tape, Ozobots with markers, science/engineering notebooks.</p>
	<p>Community Resources:</p>



<p>Reflection Methods (how individual, team,</p>	<p>Journal/Learning Log</p>	<p>✓</p>	<p>Focus Group</p>		
--	-----------------------------	----------	--------------------	--	--

and/or whole class will reflect during/at end of project)	Whole-Class Discussion	✓	Fishbowl Discussion	
	Survey		Other:	

Notes: Prior to this project, students will need math lessons on graphing, data analysis, measurement, and temperature. They will need to have completed units of study on information writing, and will need to have prior experience working with Ozobots. It is presumed that students will have experience with the engineering design process through previous lessons in Makerspace and engineering projects in class.

PROJECT DESIGN: STUDENT LEARNING GUIDE

Project: Colonizing the Moon

Driving Question: How can we, as the first Lunar Colonists and structural engineers, meet our basic needs for survival on the moon?

Final Product(s) Presentations, Performances, Products and/or Services	Learning Outcomes/Targets knowledge, understanding & success skills needed by students to successfully complete products	Checkpoints/Formative Assessments to check for learning and ensure students are on track	Instructional Strategies for All Learners provided by teacher, other staff, experts; includes scaffolds, materials, lessons aligned to learning outcomes and formative assessments
(individual and team)	Information Writing: Living on the moon *Units of Study: Information Writing *Science Notebook with notes on moon facts/data/experiments	*science notebooks *weekly check-ins with individual learners on information writing process	*Units of Study Lessons 1-18 (Info. Writing Unit) *Notes on the moon from NASA Lesson materials; videos on the moon; <i>If You Decide to Go to the Moon</i> by Faith McNulty
	Solar Oven *Engineering Design Process *Graphing *Data Analysis	*exit tickets on graphing, temperature, and data analysis *notes in science notebooks	*Graphing lessons (math) *Engineering design lessons *Lessons on reading temperature (math)
	Solar Hot Water Heater *heat is transferred from sun to tube by radiation; tube transfers heat to water by direct contact (conduction) *converting light to heat energy	*notes in science notebooks *exit tickets on temperature	*Lessons on reading temperature (math) *Engineering design lessons

	Lunar Plant Growth Chamber		
	<p>Ozobot Obstacle Course: Technology Std 12: Students will develop the ability to use and maintain technological products Tech. Std. 10: Students will develop an understanding of the role of experimentation in problem solving.</p>	<p>*Beginner Ozobot challenges *Ozobot obstacle course (preprepped for students before they develop their own courses).</p>	<p>*Ozobot introductory lessons to be completed in Makerspace</p>
	<p>Presentation to parents, students, and administration: SL.3.4: Presentation of knowledge and ideas- report on a topic with appropriate facts & relevant details, speaking clearly and at an understandable pace.</p>	<p>*Presentation worksheet filled out in advance. *Meeting with teacher to discuss group's roles in the presentation, and to go over the presentation worksheet.</p>	<p>Materials: Worksheet for students to fill out on learning throughout the unit.</p>