**Mars Farm**

**Lesson 9:** Iterate

**Problem Statement:** Students must work together in teams to create a design a growing environment on Mars that will sustain three researchers for three years. Students use the Excel tool to create and revise additional group iterations for their farms.

**Learning Objectives:**

Real world problems are often ambiguous and do not have a clear answer. Rather the problem is solved through iterations of a disciplined problem solving methodology called the engineering design process. Failing to immediately arrive at the right answer is part of the engineering process.

**Lesson Standards (NGSS, CCSS, CTE):**

MS-ETS1-4 Engineering Design

Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

**Materials**

* Science notebooks
* Excel worksheet file
* Computers
* Whiteboard / Chalkboard / DocCam

**Lesson Preparation**

* None

**Time Required**: 45 minutes

**Grouping of Students for Instruction**

As sixth grade teachers, we decided to predetermine our groups to balance for mathematical ability (lots of ratio/proportion work), engineering and design background, reading level, ELL vs. highly capable, social skills, leadership skills, organization, etc.). The students all share the same “team” roles in this PBL; however, we know some may naturally gravitate toward particular tasks.

**Procedure[[1]](#footnote-0):**

Generate Possible Solutions

Students are challenged to reduce water and space requirements while still providing the required calories. Each attempt at improving must be documented (screen shot, printout, or hand written in notebooks) and labeled as revision x+1, where x is the previous revision completed. Students should continue to iterate until they have at least 3 revisions.

**Assessment:**

* Students have documented evidence of their iterations.

**Accommodations:**

* Engineering profile could be turned into a Google Doc for word processing if handwriting an issue.
* Teacher will be reading and rereading assignment.
* Classrooms have microphones for hearing impaired.
* Teachers could also enlarge any documents under document camera.

**Extensions:**

* The instructor may choose to have students continue their iterations to reach a particular goal or as time allows.

1. The sub-sections of the procedure section (e.g., Understand the Problem, Explore the Problem) are from the Illinois Math and Science Academy’s PBL Teaching and Learning Template, however, the descriptions were developed by WABS and do not necessarily represent the views of IMSA. [↑](#footnote-ref-0)