**Mars Farm**

**Lesson 6: Introduce Excel tool**

**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. This lesson introduces students to the Excel spreadsheet needed to organize information for the food crop choices students determine best meets the criteria and constraints.

**Learning Objectives:**

Introduce excel form “Food\_Data” which shows all data of a specific fruit or vegetable automatically. Have students get familiar with the tool until they feel comfortable utilizing it on their own.

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

MS-ETS1-3 Engineering Design

Analyze data from tests to determine similarities and differences among several different design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-2 Engineering Design

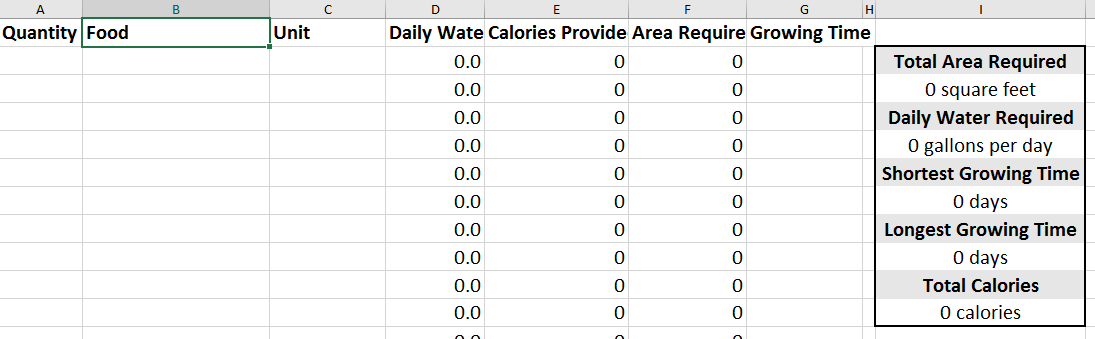
Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

#### [CCSS.Math.Practice.MP5](http://www.corestandards.org/Math/Practice/MP5/)

#### Use appropriate tools strategically.

**Materials**

* Computer with Excel (one per student or one per team)
* Excel Tool “Food\_Data”. See “Students Sheets” in Lesson06



**Lesson Preparation**

* Pull excel tool “Food\_Data” from “Students Sheets” Lesson06. See how to use “Food\_Data”. See “Food\_Data\_Teacher\_Guide” in“Students Sheets” Lesson06

(Note: We kept this on our Google Drive account and then “pushed” it out to the kids via Hapara as our district purchased this add on app. Each group will need its own access to this spreadsheet….keep in view only format!)

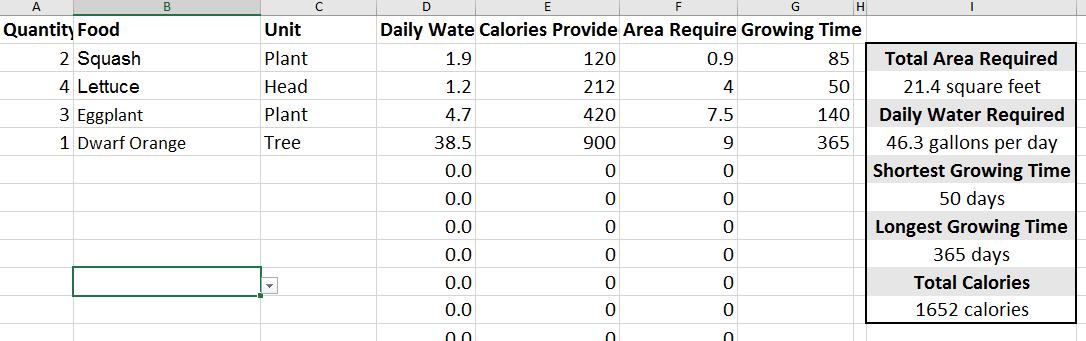
* Teacher also previews and practices using the spreadsheet. Note: You will probably wish to add in various fruits and vegetables to this spreadsheet. We kept limited choices for the first PBL group.

**Time Required**: 45 - 60 minutes

**Grouping of students for instruction:** Continue to keep students in the same groups for the rest of this PBL.

**Lesson Components:**

* Once teacher explains how to fill out the worksheet (no more than 10 min explaining this and answering questions), have students play with the excel spreadsheet either in teams or individually. Have them pick a combination of fruits or vegetables and get a total of the needed calories (3,000 kCal) but ask them questions such as: “have you noticed how much water will be required daily? are you going to be able to provide that much water? how long is it going to take before the researches can have their first fruit of vegetable? are they going to have enough food before they get their fruit/vegetables grow? how big is the area to plant the fruits and vegetables you picked? Below is an example of how a fill out spreadsheet should look like. Students should be paying close attention to the box on the right that shows all the calculations after entering the quantity and type of food. (about 30-35 minutes).



**Assessment:**

Each team or student should have a spreadsheet filled out and should be able to answer the questions on “Lesson Preparation” section. Note: We asked our children to take screenshots of their attempts and place into their Google Drive accounts and in their science notebooks.

**Accommodations:**

Classrooms have microphones for hearing impaired.

A few of our children also used a mouse instead of the computer trackpad.

Zoom feature can assist children with vision impairment.

**Extensions:** We asked the children to share the data from one of their attempts and demonstrated how to create a scatterplot with the data. We used various data components such as “calories vs. area”; “area vs. water”; “water vs. calories”, etc. as scatterplots were new to our children. This allowed them to see relationships between their choices in a more visual manner rather than simply reading the numbers from the spreadsheet. This truly helped our entire class see patterns emerge. Teachers created the scatterplots under the document camera to save time. However, individual students could create their own data representation for extensions.

**References/Resources:** “Food\_Data“ and “Food\_Data\_Teacher\_guide” saved in “Students Sheets” Lesson06.