**Lesson 1: Introduction to problem statement.**

**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. In this lesson,

are introduced to the problem statement by a close reading of the statement.

**Learning Objectives:**

The student will list and discuss challenging aspects to living on Mars and participate in a close read of the problem statement.

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

[CCSS.ELA-Literacy.RST.6-8.2](http://www.corestandards.org/ELA-Literacy/RST/6-8/2/)

Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

**Materials**

* Problem statement (copied and glued/taped into notebooks)

**Note:** Teachers may choose to use a traditional notebook or an electronic system such as Google Drive.

* Martian movie trailer (see works cited)

**Note:** While this trailer is approved for all audiences, teachers may find a few of the words used in the trailer inappropriate for his or her particular classroom.

**Lesson Preparation**

* Prep science notebooks (graph paper on one side; lined on right side).
* Prepare list of terms on chart paper: constraint, risk, criteria, proposal, controlled environment
* Decide team structure (teacher determine groups; student choice; etc.)

**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.

**Lesson Components:**

* Teacher leads discussion with children to determine what they already know about Mars. (30 minutes) . Teacher can write ideas down on chart paper or children can record in notebooks.
* Ask kids to think about the physical, social, emotional needs a person traveling to Mars would possess.
* What might be some risks associated with colonizing Mars? Benefits?
* On a personal basis “what would be the hardest part about living on Mars for you, the individual?
* Remind children of our nutritional needs (carbs, protein, fats) and the approximate number of calories required per day. Briefly review why our bodies need a balance of carbohydrates, fats and proteins.

**Note:** Teachers designing this unit pre-taught basics of botany and nutrition prior to launching.

* Show Martian trailer...note disclaimer above in materials section and discuss what elements of previous discussion appear to be present in the trailer (5 minutes).
* Teacher passes out problem statement and asks children to glue in notebook, etc. Teacher leads all class close reading where children mark up, highlight, pose questions, etc of the text to build a deeper understanding. (10 minutes). No need to dig into the specific constraints and criteria at this point.

**Assessment:**

Each student lists challenges of Mars exploration and colonization in notebook.

**Accommodations:** Describe special accommodations for any students with significant exceptional needs (i.e. visual impairment, deafness, physical impairments, etc.)

Teacher will be reading and rereading assignment.

Classrooms have microphones for hearing impaired.

**Extensions:** If time allows and/or students are interested, show images from books listed below regarding findings from Mars Rovers and video listed below depicting the descent of Spirit and Opportunity on Mars.

Works Cited

Canning, Bard. *Curiosity Descent Ultra Hi Def*. *Mashable*. Mashable, 13 Sept. 2012. Web. 15 Mar. 2016. <https://www.youtube.com/watch?v=ej3ioOneTy8>.

*The Martian: Official Trailer*. *You Tube*. N.p., 19 Aug. 2015. Web. 15 Mar. 2016. <https://www.youtube.com/watch?v=ej3ioOneTy8>.

Rusch, Elizabeth. *The Mighty Mars Rovers*. Boston: Houghton Mifflin, 2012. Print.