TOMATOSPHERE

Biology H

- https://www.youtube.com/watch?v=5KsVojEaoms

PLANT GROWTH AT THE ISS

- https://www.youtube.com/watch?v=FqtWPxTDS-M

- An Orion spacecraft with astronauts aboard is heading to Mars. On the outside of the spacecraft are several compartments for stowage of supplies and other vital equipment. These stowage compartments are sealed, with pressure and temperature conditions similar to those inside the spacecraft where the astronauts live.

- The astronauts suddenly hear an alarm indicating a problem with one of the external compartments. They perform a spacewalk a few days later to investigate the problem and find that one of the stowage compartments has been punctured by a micrometeorite. It is the compartment that contains tomato seeds – the tomato seeds that will be used to grow food in specially sealed greenhouses after the crew lands on Mars.

- The hole in the stowage compartment is patched by the spacewalking astronauts. However the hole has exposed the seeds in the compartment to the harsh space environment (-80℃ and almost no atmospheric pressure) for several days. Yikes! Although the stowage compartment has been repaired, the astronauts are now wondering ***"How will this affect the seeds that will be used to grow tomatoes on the surface of Mars?"***

TOMATOSPHERE OBJECTIVE

- Objective: to compare the germination rate of tomato seeds and the vigor and growth of tomato plants, following seed exposure to the following environmental conditions:
  - Seeds that have been in space or treated in space-like conditions (also known as the "treatment" group. These will either be seeds that spent 5 weeks on the International Space Station in April/May 2015 or seeds treated in simulated space conditions of -80℃ in a vacuum for 50 days, at the University of Guelph in Ontario, Canada
  - Seeds that have been exposed to conditions in the Earth's environment only (also know as the "control" group).


To JEM
To MPLM

THEORY

- Seeds are exceptionally resistant to damage from environmental extremes.
- We know from experience that plant seeds are hardy and resist damage from a wide range of environmental conditions on Earth, including heat, cold, and drought, however, how exactly will seeds react to having spent time in space or when treated in similar space-like conditions?

PREDICTION

- Based on what we know about seeds what do you think will happen to the seeds exposed to these conditions?
- No effect? Disastrous effect? Something in between these two extremes?
- Write down your prediction.

EXPERIMENT

- Seeds exposed to each of the two conditions are provided.
- The planting of the seed treatments will be measured and compared.
- Seeds should be planted at the same time and under identical conditions in order to control as many variables as possible.
- **Record the number of seeds planted for your submission of results.**

OBSERVATIONS

- **The number of seeds which germinate in each group will be recorded.**
- Observations should be taken daily and recorded accurately. Anecdotal information that might prove to be useful later when the analysis of the data takes place should be noted (e.g. accidents, changes in room temperature over weekends).

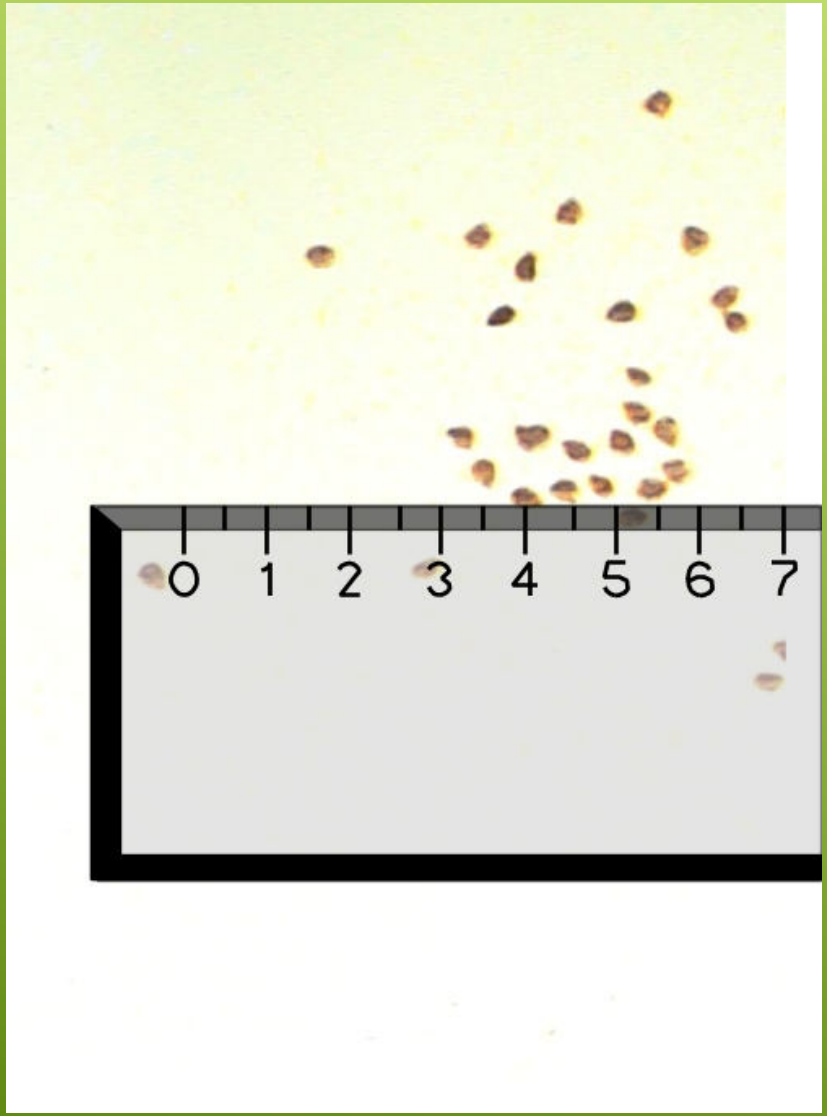
CONTROLS AND STANDARDS OF COMPARISON?

EXPERIMENTAL DESIGN

- Create a plan (who, where, when, what)
- Choose a location
- Prepare seeds
- Plant seeds
- Create a data table
- Monitor germination (Keep a daily log)

- Days since planting
- # of seeds germinated
- Other daily observations/notes/comments

CREATE A DATA TABLE



Tomato seeds are relatively small, about 2-3 mm in length. They are light enough to be blown away in drafts from open doors and windows.

In this experiment, you will be working with seeds from two different sources.
It is VERY important that you do not get the seeds mixed up.

HELPFUL HINTS

- Seeds must be kept moist, but not wet. Water gently using a fine spray from above, or by adding a small amount of water in the seed sprouting mix to keep it uniformly moist.
- Germinating seeds prefer a moderately warm uniform temperature. Large changes in temperature inhibit seed germination.
- Ensure that all seeds are germinated under identical conditions.
- Avoid direct sunlight.