SPACE SALAD

For decades, NASA researchers have been working to develop the best growing device for plants and crops to take into space. Astronauts are in need of a wider variety of nutrition and fresh food sources, and teams of scientists, botanists, and agriculturalists have been trying to find the best solution while taking into consideration the unique environmental needs in space.

Photo credit: Orbital Technologies/NASA

Congratulations!

You have been hired by Girlstart as a botanist to design a device prototype that will help plants grow in space. Use your creativity to work within the limitations of space and make design choices based on the facts. Remember, this device needs to be efficient and compact to travel in space!

Materials:

- 1 Dixie Cup
- 1 Green Pipe Cleaner
- 1 Rubber Band
- 2 Plant Stems
- 2 Straw Pieces
- 3 Craft Sticks
- 3 Toothpicks
- 4 Yellow Pom Poms
- Piece of Floral Foam

Be sure to include:

- ☐ Structure
- ☐ Light Source
- ☐ Water Source

Design your growing device prototype here:

What is the name of your growing device?

_____

What is your favorite part of the design?

_____

girlstart
www.girlstart.org

Special thanks to the Space Technology Mission Directorate of NASA!

Resources: www.nasa.gov

Design Considerations

#1: Structure and Gravity

- There is not a lot of room for storage on a spacecraft. And every extra ounce of weight requires more fuel. How will you make your device function in a small setting without being big and bulky?

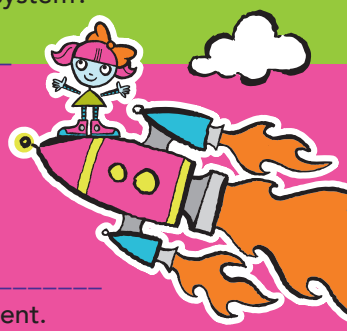
- There is very little gravity in space, so objects will float unless they are anchored down. How do soil, water, and other materials stay in your device?

- Plant cells have rigid cell walls and grow in a structured direction. But without gravity, how does a plant know what is 'up' and what is 'down'? What material would you use to guide your plant's growth so the limited gravity doesn't have a negative impact on the plant?

#2: Light and Temperature

- Plants need a light source to go through photosynthesis, which is the process plants go through to grow and create energy from carbon dioxide and water. Where would you position your light source to reach your plants?

- It can get quite dark in space being so far away from the Sun! NASA scientists are experimenting with blue, red, and green light combinations that are most like the Sun's light, so that photosynthesis is able to take place and the plant can grow. Which color or combination of colors would you use in your lighting system?



#3: Water Source

- Astronauts transport water to space in 90 pound containers similar to large duffel bags. How would you connect the water from the storage container to your device?

- The International Space Station has a system that collects and reuses all water in its environment. Does your device create any wastewater that could be recycled?

- Plants return some moisture to the air through their leaves in a process called transpiration. Does your device have a way to collect the transpired moisture?

Did you know?

- Because there are no large fields in space to grow many different types of crops, space farmers need to select crops that produce a high number of plants from the least number of seeds and least amount of work, like potatoes.

- Most fresh fruits and vegetables have parts that humans don't regularly eat (think of an orange or banana peel). NASA's team has been working on solutions to compost or dispose of these parts.

Special thanks to the Space Technology Mission Directorate of NASA!

Resources: www.nasa.gov

girlstart
www.girlstart.org