STEM@CGI
SCIENCE - TECHNOLOGY - ENGINEERING - MATHEMATICS

LEARNING LINKS FOUNDATION

NITI Aayog | ATAL INNOVATION MISSION

STEM from Home

Space

Since time immemorial, the human race has been fascinated with outer space. We have all read innumerable stories and watched dozens of films based on the many exciting possibilities of outer space. Galaxies, planets, stars, space ships, astronauts and rocket launches have always amazed us.

For decades, countries have engaged in space research and exploration. While we now know a great deal about our universe, there are innumerable mysteries yet to solve.

In this STEM Pack, you will explore the current location of the International Space Centre; construct a refractive telescope; and finally design a solution to the space debris problem.

Main Activity: **Where Is The Space Station?**

Introduction

In this project you will use a web service to find out the current location of the International Space Station (ISS) and plot its location on a map.

What You Will Need

Hardware
A computer with internet connection

Software
Trinket online editor

Additional Resources

1. Starter project - rpf.io/iss-on
2. A completed version of this project - trinket.io/python/5d3327334d
3. Open Notify web services - api.open-notify.org

Let's get started

What You Will Learn

1. Combining programming constructs to solve a problem.
2. Using a web service that provides live information about space.

Bonus Activities

Activity 1: Let's Make a Telescope

The night sky is magical, with millions of stars, planets and the moon lighting up the night. Some of these celestial objects are visible to the naked eye. Some require special instruments to help us observe them in greater detail. A telescope is a tool that astronomers use to see faraway objects.

Let's build a simple telescope and see how far we can see through it.

What You Will Need

1. Two lenses with different focal lengths (For example: 150 mm and 500 mm double convex lenses.)
2. Cardboard roll or inner tube of paper towels cling films etc.
3. 1 piece of thick paper or card paper equal or slightly longer in length to the cardboard tube.
4. Tape/ Glue /Scissors

Access the instructions for assembling the telescope here

What You Will Learn

What you have built is a simplified version of a refractor telescope. The lenses at each end work in tandem to focus on a distant object and magnify it so that you can see it more clearly.

The lens on the outside tube is called the objective lens. This lens collects light from whatever you point the telescope at.

The lens at the other end of the telescope is called the eyepiece lens. It takes the light that the objective lens has collected and enlarges it, so that when you see the image that your telescope is focused on, you see it several times larger than what you can see with your naked eye.

A Little Bit of History…..

Italian astronomer Galileo Galilei's (1564-1642) observations of our solar system and the Milky Way revolutionized the understanding of what people knew about our Universe. In 1609, using a telescope that he designed, Galileo became the first person to record observations of the sky.

Some of his discoveries:

1. Unlike the smooth sphere that the moon was thought to be, Galileo discovered that the Moon had mountains, pits, and other features, just like the Earth.
2. He discovered Jupiter's four moons. According to NASA there are currently 79 known moons of Jupiter!
3. Through his observations of the phases of Venus, Galileo was able to figure out that the planet orbits the Sun, not the Earth as was the common belief in those times.
4. He also discovered that the sun had sunspots which were darker than the sun.

Challenge Activity: Space Clean Up!

Introduction

Spotting a “No Littering” sign in your locality or in public places is very common. But would you expect to spot one in outer space? “Space littering” is a growing and increasingly dangerous problem.

Space junk comprises human-generated objects, such as pieces of space crafts, tiny flecks of paint from a spacecraft, parts of rockets and satellites that are no longer working, or explosions of objects in orbit flying around in space at high speeds.

Check out this video describing space littering

Your Challenge:

Read and research about the challenge of space littering and what efforts have been launched to address the problem.

Using your understanding of the problem, design solutions to collect and destroy this debris.

Your final submission can be presented digitally using Docs or Presentation software.

The 2013 Science Fiction movie Gravity showed astronauts in the middle of a very possible scenario called the Kessler syndrome. That’s a critical point at which the space junk has become so dense that a single collision could start a domino effect of numerous collisions, eventually destroying almost everything out there.

Check out this video