Year 8 Space: Space Mission Worksheet

**LESSON OBJECTIVES:**

* Understand and apply the concepts of gravity, and fuel consumption in space travel.
* Use Python to calculate gravitational forces and analyse their impact on space missions.
* Collaborate in groups to solve complex problems and present findings effectively.

**Introduction:**

In this worksheet, you will explore key concepts related to space missions. You’ll start by investigating gravity on Earth, in space, and on your assigned planet. Then, you'll calculate how these gravitational forces impact the mission, particularly in terms of weight and fuel consumption. Finally, you'll apply these concepts to real-world scenarios that astronauts must consider during space travel.

# Setting Up

 **Go to this link:**  
[Google Colab Notebook](https://colab.research.google.com/drive/1tbVj_lsLQ_51pESrkmIyD40xQpYRn3eY).

 **Save a copy to your Google Drive:**

* Click on "File" in the top left corner.
* Select "Save a copy in Drive."
* This will create your own copy of the document where you can make changes.

 **Running the code:**

* Each grey box contains code. To run the code, click the "Run" button (it looks like a play button) in the top left of the grey box.
* **Important:** Run the boxes in order, starting from the top. If you skip a box or run them out of order, you might see an error message.

## Jupyter Lab

**Opening the Notebook:**

* Launch JupyterLab on your computer or through <https://jupyter.org/try-jupyter/lab/>
* Upload the engage\_lesson4.ipynb to the website
* Double-click on the notebook file to open it.

**Running the Code:**

* The notebook contains cells, which are the grey boxes with code or text.
* To run a cell, select it by clicking on it, and then click the "Run" button (which looks like a play button ▶️) in the toolbar at the top.
* You can also run a cell by pressing Shift + Enter on your keyboard.

**Important:**

* Ensure you run the cells in sequential order, starting from the top. Running them out of order or skipping cells may lead to errors.
* If a cell takes time to run, be patient and wait for it to finish before moving on to the next one.

**Troubleshooting:**

* If you encounter any issues or get stuck, refer to the provided code walkthrough or help documentation for guidance.

# Section 1: Discovering Gravity Across Your Mission

What is gravity on Earth? Include units

What is gravity in space?

What is gravity on your destination planet?

What is the formula for weight?

Compare the weight of the spacecraft on each of these locations (assume a mass of 100 kg)

# Section 2: Fuel consumption

What is the equation to work out how quickly fuel will be consumed?

How long would 5000 kg of fuel last a 100 kg spacecraft with a burn rate of 0.5?

Draw a diagram illustrating the spacecraft’s fuel consumption over time. Be sure to label the axes and key points.

How much fuel would be needed to reach your assigned planet assuming a consistent burn rate of 0.5 and a 100kg spacecraft.

# Additional Activities:

Assuming you have endless fuel and are traveling at a constant speed of 17,500 mph, calculate how long it would take to reach your assigned planet. Show your calculations and include the distance to the planet in your work.