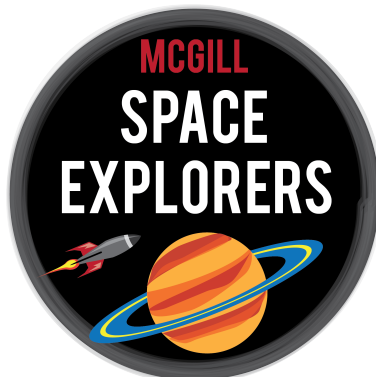


The Space Explorers Challenge



Goal: Can you make some sort of tool, web application, etc. which can help us present one of our four virtual Space Explorers modules?

Physics Matters' **Space Explorers** lesson plans are designed to be highly interactive, using real experiments and inquiry to teach young students (ages $\sim 8-12$) about basic physics. In the current state of things, we “virtually” visit these students over Zoom. Here’s your chance to help! Even when things are back to “normal”, we will keep up our virtual outreach, so your project could be used for years to come!

1 Sink or Float

The “Sink or Float” module focuses on the question of how boats are able to float through the lens of density. Students test both the weight and shape of different objects in order to conclude that it is a combination of both - what we call *density* - that determines why certain objects sink while others float. They also build both a small and large boat and test how many objects can fit on each. **A tool or web application for this module might allow students to test whether new objects sink or float, or could help students visualize density. The latter is often the hardest part of the module for them. Or, you can surprise us with something else!**

2 Gravity

In this module, students start to learn the basics of gravity. The story behind this module is that students have an underground safe to which they want to transfer some precious jewels and metals before a group of robbers arrive. The guiding question is how to get the jewels into the safe as fast as possible, where we assume the jewels are of different shapes, weights, etc. We practice (1) rolling objects down ramps with and without initial velocity and (2) simply dropping the objects (all done using marbles). We also spend some time testing air resistance using a crumpled up piece of paper compared to a flat piece of paper. **A tool or**

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web application for this module might allow students to experiment and learn more about air resistance or might recreate a virtual version of the module where students can somehow “win” the game and keep the robbers from getting the treasure!

3 Craters

In this module, students are asked how the craters on the moon were formed. They practice dropping objects of different shapes, weights and initial velocities onto pillows to compare the different crater shapes that they make. Students then use this information to make guesses on what creates the different craters on the moon. Eventually, they come to the conclusion that it is a combination of mass and velocity - what we call *momentum* - which determines the shape of the crater. **A tool or web application might simulate objects of different weights crashing onto the moon at different velocities (in a fairly simplified form).** Or, again, you could surprise us!

4 The Sun and Earth System

The “Sun and Earth System” module aims to teach students about why we, here on Earth, experience diurnal (night and day) and seasonal change. Students will use props to learn about Earth spinning about its axis and how this creates our daily cycle. Seasonal change, on the other hand, is more difficult to visualize with props, and a web application would be an excellent addition to this module. **We would love to see something that could explain how the tilted axis of the Earth, and its rotation around the Sun, affects the temperature of our planet. It is essential that the representation is easy to understand for a child.**

Prizes: Members of the winning team will **each** receive a gorgeous **Space Explorers notebook** and copies of both Ed Yong’s *I Contain Multitudes: The Microbes Within Us And A Grander View Of Life* and Dana Sobel’s *The Glass Universe: How The Ladies Of The Harvard Observatory Took The Measure Of The Stars!* And more importantly, your tool might be used to train the next generation of little scientists!