Activity Descriptions

Celestial Dome Planisphere

A planisphere, or a star chart, allows you to see which constellations are up on a given day or time. This activity, developed by Ken Wilson at the Science Museum of Virginia, is an excellent way to give each student a planisphere for home use. The other perk to this activity is that the only cost is for the CDs (~$30 for 30 disks). Most commercially available planispheres cost $6-10 each, so this is a great alternative!

If the Moon were a Penny…

It is interesting to realize that we only ever see one side of the Moon from Earth. This exercise serves to help students visualize why that phenomenon occurs. This activity will be most impactful if each student has the opportunity to perform it.

Distance to the Moon

Often times, students have difficulty visualizing exactly how large the Earth and Moon are by just reading metric distances. In this activity, students compare the Earth and the Moon to sports balls in order to gain a better understanding of the distance from the Earth to the Moon.

Germination

Use this activity to help students examine the environmental conditions needed for germination. The activity uses 35mm film canisters that can generally be obtained free from your local film development locations. Obtain as many as you can! The great thing about using canisters is that they are small and students can test their own hypotheses about germination rather easily using the canisters. Do be aware that some experiments require that seeds be watered and placed in canisters with no holes. If these canisters containing wet seeds/seedlings are left unattended for over a week, expect a pungent odor when you open them!

Build a Light Box

A light box is a wonderful way to enhance your classroom environment to keep your students' interest in plants. You could build one light box for your room, or have teams of students build light boxes for their experiments. We suggest that you build the light boxes (see link below for a photo) before you begin work on Mission 2, as you may want to go ahead and have some plants growing inside to peak student interest in the lessons ahead.

This experiment gives instruction on how to make a light box, but if you desire a larger display, there are also instructions (and photos) on how to make a light bank system at http://www.fastplants.org/instructions/lighting_systems.html - A light bank system could also be set up in the school lobby to attract school-wide interest. This project is a good candidate for parent, PTSA and community involvement. If you have a budget allowance, plant light houses are also commercially available from Carolina Biological, Inc. for $74.95 (Catalog # WW-15-8994).

Making Craters

Use this activity to help students practice measuring diameters by creating impact craters and relating this data to the Moon surface. You may want to consider conducting this experiment outside or on a surface that is easily swept in case there are any spills. Students will use pebbles 1-4 cm in diameter for this activity. You could have the students practice using rulers to gather the pebbles for the activity from the school grounds.

Do Plants really need Soil? (I)

This activity introduces students to hydroponics, a special way to grow plants without soil. Hydroponic systems have been tested in space because they offer a soil-free way of delivering nutrients to plants in space. In some designs, the plant roots wrap around porous ceramic tubes that continuously deliver water and nutrients to the plants. Hydroponic garden activities have a great deal of potential. Students can grow the same plants in soil and in the hydroponic system and compare certain characteristics or features of the plants that result. They could even grow vegetables and have a tasting party to determine if they detect a difference in taste! Students can be assigned sides of a debate - growing plants in soil vs. growing plants with hydroponics - what are the pros and cons? They will find that there are some strong opinions out there! And of course, anything grown in your classroom hydroponically could be used as part of a service or beautification project that allows students to share their plants with others and teach them about what they have learned.

When examining the procedure for growing plants hydroponically, you may notice that floral foam is required. Why? The seeds need some type of inert structure for support and for water transport but as the source of nutrients, like soil. The nutrients will come from the fertilizer that is dissolved in the water. You may want to test the floral foam that you obtain to see how well it absorbs water.

An easy hydroponic system for beginners can be found at the Donna's Day website, http://www.donnasday.com/donna/creativefun/activities/hydroponics.shtml. You will need a container that holds at least 6" of water, a Styrofoam sheet, floral foam, hydroponic nutrient solution, and seeds.

Which Lights do Plants Like?

This activity relates light, color, plants and space travel. The activity uses 35mm film canisters that can generally be obtained free from your local film development locations. Obtain as many as you can! Seedlings will be exposed to red, green and blue light. The seedlings will grow towards the blue and red lights. Why? Plants are green because they reflect green wavelengths of light. This means that plants do not absorb and use green wavelengths of light. So, plants will grow towards red or blue light that they can use to make food. What does this mean for space travel? One goal in space travel is to use minimal amounts of energy to accomplish tasks. So, instead of shining white light (all wavelengths of visible light) onto plants, scientists are studying the growth of plants under red and blue lights to reduce the amount of light energy that might be required for long duration space travel.

What Color is Light (I)

This activity will show students that white light is actually made up of many colors. You may want to use this demonstration before you introduce students to concepts of light and the visible spectrum. We suggest that you try this experiment before showing it to the students. Determine the best position for the glass and the best time of the day to use this demonstration depending on your light availability. Make sure you can find the location of the spectrum pattern on the floor. Also, you may want to leave the glass of water in this position all day and have the students observe how the pattern changes throughout the day.

What Color is Light (II)

This experiment re-emphasizes the relationship between white light and the colors of the visible spectrum. This may be an excellent activity to use in coordination with your art teacher. As students spin their color disc, the disc will appear pale gray instead of white. Explain to the students that they probably will not be able to achieve a white disc because the colors in the crayons, paint or markers are not pure enough.

Plants in Space

This activity demonstrates a unique challenge of studying and growing plants in space: different parts of the plant respond to gravity in different ways, and scientists are not yet sure why. Roots grow down, and shoots grow up. The activity uses 35mm film canisters that can generally be obtained free from your local film development locations. Obtain as many as you can! In this canister experiment, students attach a seedling to a canister lid so that the shoot sticks straight out into the canister. They are asked to predict how the shoot will grow and check it in three days. Some students predict that the shoot will grow roots and move downward…you will get all kinds of predictions! However, the shoot

will turn to grow upward. This may surprise many students, but this shows how shoots respond to gravity. Shoots are negatively gravitropic, meaning they grow away from the direction of the force of gravity. In space, the limited effect of gravity makes plant roots and shoots grow in random directions. Though gravity is not one of the 7 things that plants need to live, students may want to consider this factor as they think about the design of their chamber on the Moon, which has 1/6 Earth's gravity.

A Spacelab Experiment: Which Way is Up?

On Earth, the roots of plants grow down and the stems grow up. This five-day experiment investigates which way plants grow in space. One plant represents plants on Earth and another plant represents plants in space.

Puffy Face Syndrome

This activity simulates one effect of spaceflight on the human body, the cephalad fluid shift. On Earth, our heart pumps blood upward towards the head, but gravity pulls it back down through our body and extremities. In microgravity, the heart still pumps the blood towards the head, but there is too little gravity to pull it downward. This causes astronaut faces to look puffy or swollen for a couple of days. At the same time, their leg circumference shrinks. This all evens out eventually. When we wake up in the morning, our heads are slightly larger than they will be at any other time of the day. Why? Because we have been lying down and gravity does not work on our body the same way when we lie down as it does when we stand upright. The puffy face syndrome astronauts experience can be simulated by having one student in a team of two lie down for several minutes (at least 10, and it helps if their feet are up in a chair). When the student measures the head of the "astronaut" after lying down for several minutes, it should be larger in circumference. Be aware that data will vary. You may have heads that do not change or that even get smaller! This is a great opportunity to talk about scientific experiments. Ask students to come up with reasons why their hypothesis may not have been proven with this experiment. Ask them to consider the processes of doing good science.

Boney Bones

When astronauts go into space, the stress upon bones is reduced causing the astronauts' bones to weaken. When this happens, calcium is released into the bloodstream and the kidneys must filter the calcium rich blood. In this activity, students create a small simulation of this process. A cup of cereal, representing bone material, is placed in a zip lock bag. Students slowly apply pressure to the cereal, causing a light residue to form on the inside of the bag. In the second part of the experiment, students place warm water in a bowl. Next, antacid tablets are placed in the water. The water is then slowly poured in

to the coffee filter. After the filter is dry, students use a magnifying glass to observe the surface of the filter.

Just a Little Air in My Gel

In this experiments, students learn about aerogel, a strong yet lightweight man-made material. Aerogel has many uses, but it is currently being used to capture coment particles. Students will create a small representation of aerogel, blow "comets" (candy) into the gel, and observe the tracks the comet leaves.