Teachers Guide For: **First Grade Program: Day and Night**

Includes the full dome show: **Accidental Astronauts**

OBJECTIVES:

- Introduce 1st grade students to the mechanics of day and night
- The Sun is our source of heat and light.

This program primarily targets VA. Science standards: Interrelationships in Earth/Space Systems 1.6 but includes others as well.

Program Description:

Most curriculum programs in the Planetarium follow a similar format: a live taught introduction to the material to be covered, followed by a full dome immersive video presentation tied to that material, and a post-show live demonstration on the simulated sky to reinforce those concepts and expand upon the material covered.

Pre-show Live Introduction:

In the first-grade program, the presenter opens by querying the students, the following questions: What is the Sun?" (a small yellow star), and "What do we get from the Sun we can't live without?" (heat and light) An interviewer / interviewee format with live microphone is used to engage the whole audience.

In the darkened theater the presenter, using a globe and flashlight models the Earth and the Sun shining on it. Students are asked if they can see that the Earth has a day side and also a night side. The students are asked to describe the cause of daytime which is always obvious. However, when asked to describe the cause of night time (the Earth's shadow), many students thing the Moon is the source of nighttime. The presenter draws upon the audience's prior knowledge where, as Kindergarteners, they learned that blocking light results in a shadow and that it is the Earth's daytime side blocking sunlight from reaching its other half that is the cause of night time, and the Moon not being involved at all. This leads to a brief introduction to the

full dome show Accidental Astronauts which covers aspects of the Sun, Earth and Moon among other things.

ACCIDENTAL ASTRONAUTS (30 min)**:** The audience joins a class of robotic students on a field trip to a science center. Upon arrival two of the students, through unfortunate circumstances find themselves unfairly singled out and excluded from the rest of the group, but end up on an adventure far exceeding the learning experiences of their of fellow classmates including "accidentally" flying on a real spaceship to an asteroid, the Moon and the Sun. The artificially intelligent rocket ship "personality" serves as the somewhat compliant tour guide to the students providing the audience with numerous characteristics and conditions found on the solar system bodies visited. The accidental astronauts are vindicated at the end when their experience far exceeds the comparatively mundane visit their classmates receive at the science center. Among other things day and night, and characteristics of the Sun are presented (VA Science Std 1.6)

Post Show Live Segment

On the simulated sky the audience is shown the Sun rising in the east, reaching its highest point at local Noon in the south and then setting in the west. Students are reminded the Sun only appears to move (as do the Moon, stars, and planets), that it is in fact the Earth's rotation that creates the illusion the celestial objects are moving. After sunset, the students see that the same mechanics causing the Sun to move by day also is responsible for the motion of the stars and planets and sometimes the moon during the night. It is emphasized that the Moon is not always visible in the night sky, sometimes by day. A seasonal constellation or two are shown as the starry sky drifts East to West across the southern sky. The audience is reminded that while the Sun is a star, many of the stars are also suns to other planets that also have day and night. We continue to rotate the Earth until we begin to leave our shadow and turn back toward the Sun as it appears in the east. Lights up and exit sky theater.

Before Your Planetarium Visit:

Vocabulary words to be familiar with:

Sun, star, light, heat, planet, Moon, rotation, day, night, shadows, directions (compass points)

A School Bus Activity enroute to the Planetarium.

- The Sun, Moon, Stars and Planets appear to move across the sky due to the daily rotation of the Earth. It is an illusion caused by the simultaneous motion of, not only ourselves but everything surrounding us that is on the earth. That illusion can be demonstrated by instructing the students, once aboard the bus to observe themselves

as a group all seated together onboard the bus. As the bus begins to move, observe the buildings, trees, and other objects outside the bus. Which seems to be stationary? The students or the objects outside the moving bus. The students know they are moving as they ride on the bus and the objects outside are stationary. Nonetheless, the observed motions appear reversed. This is the same process that causes the celestial bodies to appear to move across the sky. To further the activity, the teacher could ask students to think about why ancient people from long ago believed the Earth was stationary and the celestial bodies circled around the Earth.

After Your Planetarium Visit:

- A fair number of first grade students mistakenly believe the Moon causes night time (rather than the Earth's own shadow). A post visit activity could be useful to help dispel that misunderstanding. Using an open light bulb source to simulate the Sun, provide small groups of students with two styrofoam balls, one smaller to simulate the Moon and one larger to simulate the Earth, both mounted on pencils or wooden sticks to assist in holding them. With only the Earth ball and the Sun, have the students demonstrate the night and day sides of the Earth. Now have one student pick up the Moon ball. Ask the students if the Moon ball is necessary or extraneous in the creation of night. How could the Moon going around the Earth make it night? (only when the Moon blocks the Suns light from reaching the Earth which happens during a total solar eclipse, but that "nighttime", the period of totality last only about 3 minutes, not all-night long.
- On a sunny day, create a simple sundial in the schoolyard accessible to the classroom with a stick in the dirt. Nothing fancy is necessary. Drive the stick in the ground and have students mark the location of the tip of the stick's shadow. Return after a few minutes and repeat the process several times. Ask students why the shadow has moved. (earth rotation, not because the Sun moved)

Useful Resources:

- APS Science Unit guide: SOL 1.6 The student will investigate and understand the basic relationship between the Sun and the Earth: https://www.apsva.us/wp-content/uploads/legacy_assets/www/330e816212-1.6_Sun_and_Earth.pdf