William M. Staerkel PLANETARIUM

Teacher's Guide to

"Sky Cycles"

OBJECTIVES:

- To find a few of the constellations and planets in our current night sky
- To discover two of the effects of the changing seasons
- To examine why the Moon appears to change shape in our sky
- To see the diversity of the planets in our Solar System.

This show conforms to the following state Illinois science standards: 12.F.1b, 12.F.2a, 12.F.2c, 12.F.3a, 12.F.3b. Next Generation Science Standards: MS.ESS1.1, MS.ESS1.2, 5.ESS1.2

BRIEF SHOW DESCRIPTION:

This is a live show that matches the Champaign Schools 8th grade curriculum in Space Science, though any group can reserve the show. From our backyards we notice cycles in the sky, from the Moon changing position and shape to the changing position of the Sun during the day and throughout the year. After looking at the current night sky and noticing a few constellations and planets, the show examines the phases of the Moon through a model on the dome. We then venture to a morning sky and predict where the Sun will rise, then investigate the path of the Sun during our four seasons. Lastly, if time permits, we'll zoom away from the Earth to see the planets orbiting the Sun in our solar system, noting the flatness of the planetary system and how planets closer to the Sun orbit faster.

PREVISIT ACTIVITIES/TOPICS FOR DISCUSSION:

1. Discuss how the planets are similar/different. A fun way might be to construct travel brochures for potential excursions to the planets. A trip to the library is a good first stop! For example, if you built a resort on Mars, where would you build it and why? What amenities would you offer given the harsh environment?
2. Discuss why it is cold in the winter or hot in the summer. A typical answer is that the Earth is closer to the Sun in the summer . . . .which makes perfect sense . .. but actually the opposite is true! Work in a discussion about the length of a day. The students have certainly noticed that it's usually dark before dinner time in the winter but they may have to go to bed in the summer before it gets dark.
3. If you have a sunny window, tape an "X" on the window so that it casts a shadow on the floor. What does the shadow do over several hours. What's happening (Earth's rotation)? If you do this near the start of the school year and then once before break, the path made by the Sun won't be the same. When is it higher in the sky? Lower? You can also measure the length of a shadow of something like a telephone or light pole. You can also note the times of sunrise and sunset in the newspaper - are they the same all year around? Notice the trends!

POST-VISIT ACTIVITIES/TOPICS FOR DISCUSSION:

1. Construct a scale model of the Solar System showing the sizes and distances to the planets. You will be surprised how much empty space is out there! It is easy to model one or the other (distance and planet size) but very difficult to do both in the same model. Parkland College has a solar system model that is outside and just across the perimeter drive from the

planetarium. The Sun is a 38-inch diameter iron ball. Consider walking from the Sun to the planet Mars during your visit! A brochure on the model and some other activities can be found at the link below. Another model could put a paper clip or toilet paper square as 10 million miles. Construct a pneumonic to remember the names and the order of the planets.

2. We used to use ***M***y ***V***ery ***E***ducated ***M***other ***J***ust ***S***erved ***U***s ***N***ine ***P***izzas, back when Pluto was considered a planet. Come up with a new one! The easy way is to substitute "nachos" for "nine pizzas!" And while we're on the topic . . . how does the class feel about dropping Pluto from the ranks of "planet." Was it a good move? Why or why not? Look up the modern definition of planet and see if you'd change anything. Do you like the name "dwarf planet?"
3. Construct a mission to a nearby planet. The planet itself can be a beach ball with construction paper mountains, cities, and other landscapes attached. Place the ball far from the classroom. Look at the ball with a telescope. What questions are raised? What do we want to find out about this new world? Have students then devise a mission consisting of a student with a digital camera. When the photos are downloaded, what do they tell us? What will the mission objectives be? How will we design the craft and supply power to it? Send the student to the planet and then examine the photographs. What new questions arise? Do you send a second mission? In this manner, students see what decisions NASA must go through in directing planetary exploration.
4. Early in the school year, measure the length of the shadow of something near noon. Could be a light pole or fence or something you place outside, like a meter stick. Duplicate the measurements 2-3 months later. Has the shadow length changed?
5. The reason is it hot in the summer is 1) we have more hours of daylight and 2) the sun tracks higher in the sky. You can show this with a simple flashlight. If the flashlight shines on a desk or the floor from nearly straight above the surface (high in the sky) the light is the most concentrated on the ground. If the flashlight shines at a very low angle, the light is spread over the surface and is much less concentrated, hence the ground does not heat up as much in the winter.

VOCABULARY LIST:

Wanderer	Terminator	Planet	Constellation
Solstice	Gibbous	Orbit	
Equinox	Eclipse		

INTERNET RESOURCES:

- Peoria's scale Solar System model: https://www.peoriariverfrontmuseum.org/dome-planetarium/community-solar-system
- Parkland's model solar system: https://www.parkland.edu/Audience/Community-Business/Parkland-Presents/Planetarium/Educational-Resources/Campus-Solar-System
- Solar System tour: https://nineplanets.org/
- Current space missions: http://www.jpl.nasa.gov/
- Astronomy applets: http://astro.unl.edu/naap/
- Need star charts for the class? https://www.parkland.edu/Audience/Community-Business/Parkland-Presents/Planetarium/Educational-Resources/Star-Charts
- "Eyes on the Sky" blog & videos: http://eyesonthesky.com/Home.aspx