U-46 Planetarium Lesson Scope & Sequence 2023-24

Note: Every grade level has a course in Canvas Commons to copy/import titled U-46 Planetarium X grade 2020 that was built on the performance expectations listed below. This course has relevant material for teachers to use, but has not been updated recently.

Kindergarten (any time after September)

K-PS3-1 Make observations to determine the effect of sunlight on the Earth's surface

K-ESS 2-1 Use and share observations of local weather conditions to describe patterns over time

- Sun= bright, higher is warmer DAYTIME: No Sun= dark and cold NIGHTTIME
- When the Sun is blocked it gets cooler. Clouds and other objects can block the sun to make shade.
- Direct sunlight warms surfaces, and some surfaces get warmer than others
- *One World, One Sky* full dome video

Grade 1 (1st or early 3rd trimester)

1-ESS1.1 Use observations of sun, moon and stars to describe patterns that can be predicted

*****1-ESS1.2 Make observations at different times of year to relate amount of daylight to time of year

1PS4-2 Make observations to construct evidence-based account that objects can be seen only when illuminated

- Observe moon over the course of a month to discern pattern, what is the bright and dark?
- Compare the sunset and/or sunrise times different times of year, notice patterns-connections
- Use a notebook or journal to practice scientific observing and recording of the moon
- Not a focus on **why** we see moon phases, but noticing patterns we see over time (east-west daily, wax and wane)
- *The Moon* full dome video (tchrs receive class set of moon notebooks)

Grade 2 (anytime)

2-PS1-1 describe and classify different kinds of materials based on observable properties *(supports 2 PS1.2)*

2-ESS1-1 Earth features can change quickly or slowly *(supports 2-ESS2.1)*

- Sort planets and rocks by observable properties (size, surface features, color, etc…) focus on rocky vs gas
- Melted rock, magma and lava vs. hard rock (temperature)
- Impact craters, what are they? How they happen, what is the evidence of that?
- New craters vs. old craters, how old is old? What evidence is there?

Grade 3 (anytime)

3-PS2-3 Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other

- Some planets have magnetic fields, what evidence is there? What does the magnetic field around a planet look like? How do we know its there?
- What are some effects of Earth's magnetic field. Good or bad? (Aurora borealis)

3-PS2-2 Make observ./measurements of an object's motion to provide evidence that a pattern can predict future motion

- Sun rise and set, moon changes, seasonal changes as examples
- Can we predict future groupings of planets or moon phases or sunrise times as seen from Earth?
- Planets are in motion around the Sun and go different speeds (rotate vs. revolve): notice patterns of movements and forces keeping planets in orbit (balanced and unbalanced)

Grade 4 (end of 2nd trimester to end of year)

4 ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features.
4-PS3-3 Ask questions and predict outcomes about the changes in energy that occur when objects collide.
SS. EC.2.4 Describe how goods and services are produced using human, natural, and capital resources (e.g. tools and machines)
SS.G.2.4 Analyze how the cultural/environmental characteristics of places in IL change over time.

- Compare old and new craters based on rock age using satellite imagery and maps (Chicxulub)
- Compare age of fossils based on depth, specifically pre and post 65 million years
- Explore shocked quartz and iridium layer as evidence
- Compare meteoroids, asteroids and comets as explanations for impacts
- Connect evidence of an asteroid impact 65 million years ago to dinosaur extinction (iridium layer & fossils above and below it, shocked quartz, Chicxulub crater age)
- Share history of the building and the difference between observatory and planetarium (transit scope, watches and Elgin economy/culture, time telling and signals)
- Tour upstairs observatory as permitted (stair climbing required)
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5th Grade (2nd trimester to early 3rd trimester, ISA in March (at least 2 of the 3 PEs addressed)

5-ESS1-1. Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth
5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.
5-PS2-1. Support an argument that the gravitational force exerted by Earth on objects is directed down. (supporting)

- Demonstrate relative distances to stars compared to the Sun, and measured brightness of them
- Use animations (space view) and (Earth view) and graphical displays to explore what we see in space, how changes as we go around the sun (nighttime seasonal stars, yearly calendar)
- Predict/discuss changes in the Sun's location in the daytime sky (sunrise, noon & sunset) as the Earth *revolves* around the Sun.
- Analyze position of Polaris as the Earth rotates **and** as it revolves around the Sun.
- Mark positions of sunrise and sunset on graphical display at different dates, note the height of the Sun at noon at different times of the year to look for patterns (time lapse seasons animations)

6th Grade (second trimester to end of year)

MS-PS2-1. Apply Newton's 3rd Law to design a solution to a problem involving the motion of two colliding objects
MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object

- How objects move, don't move or change movement
- Sometimes slower things have more energy: How can that be?
- Gravity: a force that pulls things together everywhere. Even in space.
- Why don't planets all crash into the Sun? (Inertia balanced with gravity)
- But what if they are not balanced? Can humans plan to prevent an asteroid hit? How do we calculate the risk?
- How do we draw the forces in a diagram?
- What's the story behind Perseus and Andromeda? (replaces some of above if chosen)