**Astronomy: Earth & Space Systems**

**Planetary Properties**

***Essential Question:*** *What evidence do astronomers use to justify how planets are classified?*

***DoDEA Standards:***

* *Demonstrate an understanding of process skills (classification)*
* *Summarize the characteristics and movements of objects in the solar system*

***CSI Smart Goal #1: All VMS students will improve their reading comprehension***

***skills.***

***CSI Smart Goal #2: All VMS students will improve their ability to communicate***

***math ideas by justifying their claims with evidence.***

***Goal*:** To identify patterns within a data set of planetary properties to determine how the planets can be grouped based on the characteristics they have in common

**Background Information:**  The solar system formed approximately five billion years ago from a slowly rotating cloud of dust and gas. Over time, the force of gravity caused this cloud to collapse into a disk. At the center of the disk, intense pressure caused the Sun to form. The remaining material within the disk then combined to form the individual planets. (*Origins: Fourteen Billion Years of Cosmic Evolution*, Tyson and Goldsmith, 2005)

**Resources:**

Nine Planets - <http://nineplanets.org>

Solar system exploration (NASA) - <http://solarsystem.nasa.gov>

**Phase 1: Data Collection**

***How can the planets be grouped according to their properties?***

Each team (2-3 students) will be assigned a planet or dwarf planet to research. Work together with your team to analyze the data collected from the resources provided. Research the specific properties listed:

1. the planets’ distance from the Sun,
2. the mass of the planets,
3. the planets’ size (diameter),
4. the density of the planets,
5. the composition of the planets,
6. the temperature of the planets,
7. the planets’ orbital period,
8. the planets’ tilt,
9. the planets’ number of moons, and
10. whether or not the planets have rings

**Fill in the data for your assigned planet(s) and/or dwarf planet in the chart below. Use numerical values for each category (except Composition).**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Mercury** | **Venus** | **Earth** | **Mars** | **Jupiter** | **Saturn** | **Uranus** | **Neptune** | **Pluto** | **Ceres** |
| **Distance (AU)** |  |  |  |  |  |  |  |  |  |  |
| **Mass** |  |  |  |  |  |  |  |  |  |  |
| **Size** |  |  |  |  |  |  |  |  |  |  |
| **Density** |  |  |  |  |  |  |  |  |  |  |
| **Composi-**  **tion** |  |  |  |  |  |  |  |  |  |  |
| **Temp. (℃)** |  |  |  |  |  |  |  |  |  |  |
| **Orbital Period** |  |  |  |  |  |  |  |  |  |  |
| **Tilt on Axis** |  |  |  |  |  |  |  |  |  |  |
| **# of Moons** |  |  |  |  |  |  |  |  |  |  |
| **Rings** |  |  |  |  |  |  |  |  |  |  |

**Phase 2: Data Analysis**

In your team, develop a claim that is supported by evidence to answer the investigative question (***How can the planets be grouped according to their properties*?**)

A **claim** is “a statement or conclusion that answers the original question/problem,” **evidence** is “scientific data that supports the claim,” and **reasoning** is “a justification that connects the evidence to the claim using scientific principles.”

**Phase 3: Scientific Argumentation**

Use the paper provided to chart out your argument. Record your claim and the evidence to support your claim. Teams will take turns justifying their claims with the evidence during a class “board meeting”.

For example,

TEAM MERCURY

Claim: Our claim is that the planets should be placed into 4 groups.

Group 1:

Group 2:

Group 3:

Group 4:

Evidence:

**Phase 4: SUMMATIVE ASSESSMENT**

Each member of your team is required to write a summary argument justifying claims with evidence.

**CLAIMS & EVIDENCE SCORING RUBRIC**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **0** | **1** | **2** |
| **CLAIM** | The claim does not answer the investigation question. | The claim partially answers the investigation question. | The claim sufficiently answers the investigation question. |
| **EVIDENCE** | The evidence does not include specific/accurate data that support the claim. | The evidence includes some specific/accurate data that support the claim.. | The evidence includes sufficient specific/accurate data that support the claim. |