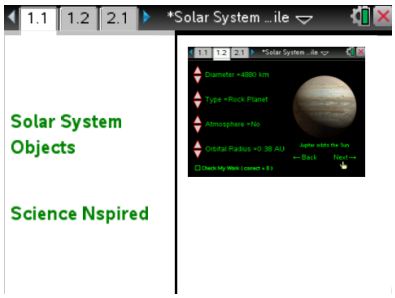
What Makes a Planet?

MIDDLE GRADES SCIENCE NSPIRED

TEACHER NOTES

Science Objectives

- Students will investigate and differentiate between planets, moons, and asteroids.
- Students will understand how planets are classified.



Vocabulary

- orbital radius
- astronomical unit
- asteroid
- orbital zone
- planet
- moon
- gravity

About the Lesson

- As a result of this lesson, students will:
  - Understand that in order to classify an object as a planet, it must be in orbit around the Sun, have sufficient mass to assume a nearly round shape under its own gravity, and have a clear orbital zone free of any other objects.
  - Examine characteristics of celestial bodies such as diameter, orbital radius, presence of atmosphere, and orbital path.

TI-Nspire™ Navigator™

- Send out the *What_Makes_a_Planet.tns* file.
- Monitor student progress using Class Capture.
- Use Live Presenter to spotlight student answers.

Activity Materials

- Compatible TI Technologies: TI- Nspire™ CX Handhelds, TI-Nspire™ Apps for iPad®, TI-Nspire™ Software

Tech Tips:

- This activity includes screen captures taken from the TI-Nspire CX handheld. It is also appropriate for use with the TI-Nspire family of products including TI-Nspire software and TI-Nspire App. Slight variations to these directions may be required if using other technologies besides the handheld.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials

Lesson Files:

Student Activity

- What_Makes_a_Planet_Student.doc
- What_Makes_a_Planet_Student.pdf

TI-Nspire document

- What_Makes_a_Planet.tns

Discussion Points and Possible Answers

Have students read the background information on the student activity sheet or on pages 1.2 & 1.3

Move to pages 1.4 – 1.5.

Have students answer questions 1 and 2 in the .tns file, activity sheet, or both.

Q1. The "orbital radius" of an object represents what?

Answer: D. the distance between an object is and its orbiting body

Q2. The IAU (International Astronomical Union) has developed rules in order for a celestial body to gain planetary status. Which of the following are these rules? (Select all that apply)

Answer: orbits a star; has sufficient mass to assume a round shape under its own gravity; has a cleared orbital zone

Move to page 1.6.

1. Students will see an image of a celestial body as well as text stating the object around which the body orbits. Have students select the up and down arrows (▼ and ▲) on the left of the screen to change the values for diameter, object type, atmosphere, and orbital radius.
2. Once students believe that they have selected the correct values for the celestial body, they should select the *Check My Work* box on the lower left hand corner of the screen. If all of the values are correct, a happy alien face will appear.
3. If some of the values are incorrect, students should deselect the *Check My Work* box and modify the remaining incorrect values. When students believe they have found the correct values, they should select *Check My Work* again. Have students repeat this process until they see the happy alien face appear.
4. Once students obtain the correct values for a body, they should record the values in the table on their student activity sheet. Then, they should select *Next* in the lower right corner of the screen to advance to the next celestial body.

Tech Tip: To access the Directions again, select > **What Makes a Planet > Directions.**

Tech Tip: To access the Directions again, select menu or **Document Tools ( ) > What Makes a Planet > Directions.**

Celestial Body	Diameter of Object (km)	Orbital Radius (AU)	Type of Object	Atmosphere?
Mercury	4,880	0.38	Rock Planet	Yes
Venus	9,738	0.72	Rock Planet	Yes
Earth	12,742	1	Rock Planet	Yes
Mars	6,800	1.6	Rock Planet	Yes
Jupiter	142,984	5.4	Gas Planet	Yes
Saturn	116,464	9.53	Gas Planet	Yes
Uranus	50,724	19.19	Gas Planet	Yes
Neptune	49,346	30.07	Gas Planet	Yes
Pallas	1088	2.77	Asteroid	No
Amalthea	167	.001	Moon	No
Titan	5150	.008	Moon	Yes
Luna	3472	.0025	Moon	No

Move to pages 2.1 – 2.9.

Have students answer questions 3 - 11 in the .tns file, the activity sheet, or both.

Q3. Which of the following is an accurate statement when you compare the gas planets to the rock planets?

Answer: B. Gas planets have a larger diameter and a larger orbital radius.

Q4. Around which object does a moon orbit? Around which object does a planet orbit? How does the magnitude of a moon's orbital radius compare to a planet's orbital radius?

Sample Answer: A moon orbits around a planet. A planet orbits around a star. The orbital radius of a moon is much smaller than the orbital radius of a planet.

Q5. Which of the following reasons is the best explanation for why an asteroid is not classified as a moon?

Answer: A. An asteroid does not orbit a planet.

Q6. Which of the following planets do not have an atmosphere? (Select all that apply)

Answer: All of the above planets have an atmosphere.

Q7. Is it possible for a moon to have an atmosphere?

Answer: Yes.

Q8. Pallas has an orbital radius of 2.77 AU. Knowing this, what two planets does it orbit in between? (___ and ___)

Answer: Mars and Jupiter

Q9. At one time, Pallas was a candidate for being classified as a planet. Which of the following reasons prevents Pallas from being classified as a planet?

Answer: Pallas does not have a cleared orbital zone.

Q10. Titan is spherical and larger than the planet Mercury. It also has an atmosphere. Why is Titan not considered a planet?

Sample Answer: Titan orbits Jupiter, which is a planet. In order to be considered a planet, Titan would need to orbit the Sun.

Q11. Using the information you gathered throughout the simulation, place the planets in order of increasing distance from the sun.

Answer: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune

TI-Nspire Navigator Opportunities

Make a student a Live Presenter to show how to manipulate the values for each celestial body . Throughout the activity, monitor student progress. At the end of the activity, collect the .tns file and save to Portfolio.

Wrap Up

When students are finished with the activity, retrieve the .tns file using TI-Nspire Navigator. Save grades to Portfolio. Discuss activity questions using Slide Show.

Assessment

- Formative assessment will consist of questions embedded in the .tns file. The questions will be graded when the .tns file is retrieved. The Slide Show will be utilized to give students immediate feedback on their assessment.
- Summative assessment could consist of questions/problems on the chapter test or a performance assessment having students make a scale model of our solar system.