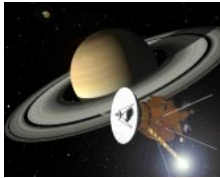


# The Mysteries of Saturn and Cassini

*Artist's rendition of Cassini at Saturn.*



## LESSON TIME

*1 hour for the activity plus 15 minutes for reflective writing and sharing*

## MATERIALS CHECKLIST

- Pencils
- Printouts of seven Saturn/Cassini-Huygens images
- Seven pieces of butcher paper marked with three columns the long way

## LESSON NO. 2

- *Language Arts Focus — Nonfiction Writing Practice: Descriptive Writing*
- *Science Focus — Observing and Wondering: Essential Tools for Science*

### OVERVIEW

It is fitting that your students start learning about Saturn as the first observers of Saturn did — by observing and wondering. Your students will look at pictures of Saturn, Cassini, and the Huygens probe and write what they notice, know, and what they wonder. This activity invites students to observe carefully, and learn from each other, while providing you with an idea of students' knowledge of this topic.

### WHY THIS WORKS

The images in this lesson provide breathtaking pictures of Saturn and the Cassini-Huygens mission. Students will see that the images are numbered but not labeled. This lesson uses three prompts (what I notice, know, and wonder) to promote three types of thinking: observing, forming conclusions, and wondering. Writing “what I know” forces students to consider whether they are really sure about their conclusions.

Identifying questions forms the basis for inquiry throughout the unit. The National Science Education Standards state that, “Inquiry into authentic questions generated from student experiences is the central strategy for teaching science.” Throughout the rest of this unit, students will read actively to find answers to their questions. Unanswered questions spark a lifelong curiosity to learn more about space, and follow discoveries as they are made. You may want to model your learning process by participating in this activity and writing what you notice, know, and wonder.

### Objectives

- Teachers will:
  - Learn the extent of your class's previous experience with Saturn, Cassini, and space science.
- Students will:
  - Learn to observe carefully and record observations and questions.



### Teacher Preparation

Print out teacher references pages 1 through 7 and cut out the Saturn/Cassini-Huygens images. The images are:

Image 1 — Saturn (Photo by Voyager)

Image 2 — The Saturn system (Photo by Voyager. The moons shown are, starting at upper right and proceeding clockwise, Titan, Mimas, Tethys, Dione [directly in front of Saturn], Enceladus, and Rhea.)

Image 3 — Cassini spacecraft approaching Saturn

Image 4 — Cassini launch

Image 5 — Cassini's path to Saturn

Image 6 — What the Huygens probe looks like as it descends to Titan's surface

Image 7 — Drawing of Saturn ring particles

Create seven charts by attaching images to the tops of sheets of butcher paper (long way). Using a large marker, divide each sheet of butcher paper into three columns under the image and label as follows — “What I Notice,” “What I Know,” and “What I Wonder” (for student writing exercise). Decide how you will partner students so that all groups will have a chart to write about. (For example, if there are 28 students in your classroom, the students will work in groups of four.) Place charts and paper in seven locations around the room. Decide what signal you will use to have the students rotate images, and how you will make sure the rotation goes smoothly.

### What to Do

*Introduce the Activity — Suggested time 10 minutes*

1. Tell the class they will begin learning about Saturn and Cassini by looking at some pictures of the planet, the spacecraft, and the probe. Tell the class that they will be looking at the pictures in groups of (the total number of children in your class divided into seven groups), and explain how those groups will be determined.
2. Look at one of the images and model what you notice, know, and wonder before the students begin. For example, you could look at the first image (Saturn) and read:
 

“Here is what I notice: I notice that there seem to be different colors swirling around the planet. I also notice a dark space in the rings. Here is what I know: I know that Saturn is considered a planet. Here is what I wonder: I wonder how astronomers decide that something is a planet. I wonder why there are different colors on the planet, and what would cause the dark space in the rings. I wonder who or what took this picture of Saturn. I wonder if it is a real picture.”
3. Hand out the seven Saturn charts with images, one per group. Explain the directions for today's assignment to the students:
  - a) When a chart arrives at your group, look at the image carefully.
  - b) In the first column, record what members of the group notice under the label “What I Notice.”



- c) In the second column, discuss what you know with the group. Record a few things on the chart.
  - d) In the third column, discuss what you wonder with the group. Record a few things on the chart.
  - e) At the signal, one person in your group will take the chart to the next group.
  - f) When you get your new chart, you will do the same activity with the new image.
  - g) Make sure you discuss ideas with your group before you write anything on the chart.
4. Explain the order for rotating the images.
  5. Ask the students to brainstorm ideas for what they should do if they run out of space to write.

*Observe, Discuss, and Write — Suggested time 50 minutes*

About every seven minutes, give the signal to have the students rotate the charts.

*Write in Saturn Discovery Log — Suggested time 10 minutes*

1. Post the charts with the images in the classroom, and encourage students to circulate to see what everyone wrote.
2. Explain that after they look over the images, they will do a five-minute “quick-write” in their Saturn Discovery Log entry to the prompt: “What did you notice about doing this activity?” “What surprised you about doing this activity?” Tell students that they will be sharing their entries with a partner at the end of the lesson.

*Share with a Partner — Suggested time 5 minutes*

1. Have students share their log entries with a partner.
2. Ask students to write their name and date on their work, and put it inside their Saturn Discovery Log.

### **Extensions**

You may want to have the gallery of images on the Cassini website bookmarked on the computer for the children to explore — <http://saturn.jpl.nasa.gov/multimedia/index.cfm>



### Assessment

While children are working, ask yourself the following questions: Are the students engaged in dialogue when they view the images? Have they learned to discuss science ideas in a group setting? If they have, this skill will enrich their experience throughout the unit. If they have not, you will want to emphasize and model partner and group dialogue throughout the unit. Discuss the following strategies: making eye contact, encouraging others to share ideas by asking them what they think, and paraphrasing to make sure you understand what the other person has said.

As you read over the children's work, ask yourself the following questions:

1. Which area of the writing assignment are the students most comfortable with?
2. Have they had solid experiences with observing carefully as demonstrated by their work?
3. Do they understand that what they know has to be supported by evidence?
4. Do they take risks and ask imaginative questions?

Note the strengths that you see. If you notice that the whole class seems less experienced in a particular area, support this skill development by modeling and encouraging your class in this area. For example, if their observations are superficial, you may want to support future observations by modeling your detailed observations of the ceiling of your classroom. If students "know" something, ask how they know it to support the idea of the importance of evidence. If students ask only "safe" questions, model risk-taking with your questions. Once you have established goals for your students based on this exercise, share them with your class in future lessons, and encourage your class to discuss how they did with the goal.

2. What misunderstandings might the students have?

Note ideas that they have about science content that you would like to address in future lessons. Jot these ideas down next to the lesson in the unit in which they would be most appropriately integrated.

### Standards

*National Council of Teachers of English and International Reading Association Standards for the English Language Arts*

All students must have opportunities to:

- Participate as knowledgeable, reflective, creative, and critical members of a variety of literacy communities.
- Use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

*National Science Education Standards*

As a result of their activities in grades K–4, all students should develop understanding:

- About scientific inquiry (Science as Inquiry).
- Of objects in the sky (Earth and Space Science).







