

Family Space Day Overview

Family Space Day is a three hour event. The activities are set up so that children and parents can select the order in which they undertake activities. Parents and children are encouraged to learn, play, and explore *together*.

Objectives of the Day

Children will:

- learn characteristics of the Gas Giants.
- model their sizes and distances from the Sun.
- discover that the Gas Giants are much larger than Earth and made of different materials.
- investigate the interiors of the Gas Giants.

Activities

- Station 1: Gas Giant Posters
Children and their parents will view 8 posters with basic information about the four gas giants such as distance from Earth, temperature, make-up, and size to gain a better understanding of the planets.
- Station 2: Rocky Planet or Gas Giant
After viewing the posters, children will determine whether the statement given is a description of an inner planet or an outer planet.
- Station 3: Candy Gas Giants
Using craft materials or edible materials, children create a model of Earth and a model of their favorite Gas Giant.
- Station 4: Gas Giants Sun Catcher
Children create sun-catchers in the shape of the four outer planets.
- Station 5: Solar System Mobile
With the aid of clues found in "The Solar System I'm Rhyme" song, children learn about the characteristics and sizes of the planets in our solar system and create their own "Solar System on a String" mobile.
- Station 6: Where are they? Traveling to the Gas Giants
Children investigate the distances between, and relative sizes of, the Sun, Earth, and different Gas Giants in this active modeling activity.
- Station 7: Storms on Jupiter
In this demonstration activity, your child will see how the clouds swirl around in a storm and compare them to the Great Red Spot's movement.

- Station 8: Saturn Model
Children create a model of Saturn using a Styrofoam ball and paper plate.
- Station 9: Saturn Flip Book
Children learn about Saturn's layers as they create their own flip book.
- Station 10: Coloring Sheets and Games
Children can relax and color and play simple games related to the gas giants.
- Station 11: Reading Room
Children and their parents can browse and read a selection of books about the gas giants (refer to book list for suggested reading).

Other Materials

- *Facilitator Information – Gas Giants*
- *Explore the Gas Giants - Book and Website References*
- *All About the Gas Giants – A Gas Giant Fact Sheet*

Facilitator Information

(All you need to know about Gas Giants to survive the day)

A **gas giant** is a large planet that is mostly made of gas (or gas compressed into a liquid). Unlike rocky planets, gas giants do not have a well-defined surface. There are four gas giants in our solar system: Jupiter, Saturn, Uranus, and Neptune. These are also known as the **Jovian planets**.

Jupiter

Jupiter is the largest planet in our solar system; about 1000 Earths could fit inside a hollow Jupiter. It contains more mass than all other planets combined. Because its composition is similar to the Sun, people often ask if Jupiter is a failed star. However, Jupiter would have to be at least 80 times more massive to create its own energy through the process of fusion, and thus, be a star.

Overall, Jupiter is about 90% hydrogen and 10% helium with some methane, water, and ammonia. Jupiter is thought to have a small core of rocky material. The core is surrounded by liquid metallic hydrogen (think liquid mercury to get a sense of what this could be like). It is liquid, rather than hydrogen gas, because of the immense temperatures and pressures of Jupiter. The outer layer of Jupiter is hydrogen and helium liquid that gradually transitions to a gas at the surface – the atmosphere. Water, carbon dioxide, methane and other materials are present in very small amounts.

Temperatures reach -200°C (-325°F) at the top of the atmosphere. Jupiter spins on its axis once every 10 hours and orbits the Sun once every 12 years. This makes its atmosphere tumultuous. The atmosphere is divided into distinct bands. Wind speeds are high - up to 400 kilometers per hour (250 miles per hour)! Lightning on Jupiter is frequent. The Giant Red Spot is a massive storm system, twice the diameter of Earth, that has been raging for at least 300 years. Jupiter does have rings, like Saturn, but they are very faint.

Jupiter has at more than 60 moons. Galileo, the first person to look at Jupiter with a telescope, discovered four moons – Io, Ganymede, Callisto, and Europa. Ganymede, the largest of Jupiter's moons, is larger than the planet Mercury. Io is the most volcanic body in our solar system. Europa, covered by an icy surface that floats above an ocean of water, may harbor life.

Saturn

Saturn, first viewed through a telescope by Galileo, is the second-largest planet. It is about 75% hydrogen and 25% helium with traces of water, methane, ammonia. It's interior is thought to be similar to Jupiter's – a rocky core, a liquid metallic hydrogen center, and an outer layer of hydrogen.

Saturn is best known for its beautiful rings. The ring system stretches to a diameter of 250,000 kilometers (155,000 miles) but is only 1 kilometer thick (a little over half a mile). They are made mostly of particles of water ice.

Its day is 11 hours long and its orbit around the Sun takes about 30 years. Saturn's atmosphere does have bands, but they are not as easily seen as Jupiter's. Winds reach 1770 kilometers per hour (1100 miles an hour). Saturn has almost 60 moons; more are being discovered by the Cassini mission.

Uranus

Uranus, third largest planet in our solar system, was the first planet discovered by telescope. Uranus is thought to contain mostly rock and various types of ice that are distributed uniformly throughout the planet, with only about 15% hydrogen and a little helium. Like the other gas giants, its atmosphere is mostly hydrogen and helium. It has a little methane in its atmosphere, which absorbs red light, giving Uranus its blue-green color. Uranus does have bands and rings, but these are very faint.

Uranus rotates on its axis once every 17 hours and orbits the Sun once every 84 years. Unlike the other planets, Uranus' axis is tilted so that the planet rotates on its side. Given Uranus' long period of orbit, this translates into a 20-year winter or summer! Uranus has almost 30 known satellites.

Neptune

Neptune is the most distant gas giant planet. Neptune's interior is thought to be similar to Uranus' but it may have a small rocky core. Like Uranus, it has methane in its atmosphere, which gives it the blue hue.

Neptune has the fastest winds in the solar system (2000 kilometers or 1250 miles per hour!), and some massive storm systems that move within its atmosphere. Neptune spins on its axis once every 16 hours, and an orbit around the Sun takes 165 years. Because Pluto's orbit is so eccentric, it sometimes crosses Neptune's orbit, making Neptune – not Pluto – the farthest planet-body from the Sun for a few years. Neptune has more than 10 known moons and several rings.

Galloping Through the Gas Giants

Interactive Posters

In this activity, you and your child will discover together basic information about the amazing gas giants! After you've viewed them all, you'll circle the answer that best fits the description given.

What You Need:

- 8 sheets of poster board in different colors
- Large print-outs of the below information and questions
- Glue or tape to adhere the information to the poster boards
- Scissors
- Color images of the Gas Giants
- Print-out of below "Rocky Planet or Gas Giant" Question and Answer Sheet

What to Do:

Use the information in each of the following "mini-posters" to create a big, bold, colorful poster with related images.

Make sure the answers to the questions are on the posters, but covered by a page labeled "lift me" that hides the answer.

Have the children and their parents respond to the questions together and read through the related information on each poster to gain an understanding of the gas giants.

Poster 1.

What are the names of the Gas Giant planets and why are they called the Gas GIANTS?

Answer: Jupiter, Saturn, Uranus, and Neptune!

Gas Giants are made of gas and they are the biggest planets – the giants - in our solar system!

Jupiter and Saturn are mostly made of Hydrogen with Helium.

Neptune and Uranus are made of rock and ice and some Hydrogen and Helium. Their atmospheres contain a little methane gas – which gives these planets their blue color!

It would be very hard to land on the Gas Giants because they don't really have a solid surface!

Poster 2.

Which of the Gas Giants is farthest from Earth?

Answer: Neptune is the farthest Gas Giant. It is over 2 and a half billion miles from Earth!

The order of the Gas Giants is Jupiter (closest to Earth), then Saturn, then Uranus, and finally Neptune (farthest from Earth)

Jupiter is over 400 million miles from Earth

Poster 3.

True or False: ALL the Gas Giant planets have rings like Saturn.

Answer: True!

What are Saturn's rings made of?

Answer: Saturn's rings are made mostly of WATER ICE Particles!! The rings are not solid, but bands of small particles. The rings are nearly 155,000 miles across but less than half a mile thick.

Poster 4.

Which planet has the most moons??

Answer: Jupiter has 63 moons (as of our latest count!). Some moons like Ganymede and Europa are icy and some – like Io - have volcanoes!

Score Card: Saturn = 59, Uranus = 27, Neptune = 13

Jupiter also has the largest moon – icy Ganymede. Saturn's moon Titan is the second largest.

Poster 5.

What causes Jupiter's Stripes or Bands??

*Answer: Jupiter's stripes are created by strong WINDS!!
All of the Gas Giants have bands – but Jupiter's are the easiest to see.*

Which Gas Giant has the longest year??

Hint: It's the one that is the farthest gas giant from the Sun and has the longest distance to travel!

Answer: It takes Neptune 165 Earth years to orbit the Sun! Only Pluto takes longer (248 Earth years)

Uranus = 84 Earth years to orbit the sun
Saturn = 29 Earth years to orbit the sun
Jupiter = 12 Earth years to orbit the sun

Poster 6.

Which planet is the largest?

Answer: Jupiter is the biggest Gas Giant. It is 11x the width of Earth!

Which planet is the only one in our solar system that spins on its side??

Answer: URANUS is the only planet in our solar system that spins on its side!

Poster 7.

Which is the windiest planet in the whole solar system?

Answer: Neptune is the windiest planet with winds over 1250 miles per hour!

That's fast – That's 5x's stronger than the strongest hurricane winds on Earth!!

Poster 8.

True or False: Neptune is the farthest planet from the Sun?

Answer: True ... Sometimes!

Sometimes Neptune's orbit around the Sun takes it OUTSIDE of Pluto's orbit (because Pluto's orbit is so elliptical). For about 20 years of every 250 years, Neptune is the FARTHEST planet in our solar system.

NEPTUNE sometimes switches places with Pluto as the planet in our solar system farthest from the Sun.

Which Gas Giant is known as the BLUE planet?

*Answer: NEPTUNE is known as the **BLUE** planet. It is blue because it has methane gas in its atmosphere.*

Rocky Planet or Gas Giant?

Circle which type of planet fits the sentence: an inner “rocky planet” or an outer “Gas Giant.”

These planets are the biggest in the Solar System.	Rocky Planets	Gas Giants
These planets have rocky ground that a spaceship could land on.	Rocky Planets	Gas Giants
These planets are closer to the Sun.	Rocky Planets	Gas Giants
These planets have lots of rings.	Rocky Planets	Gas Giants
These planets have lots of moons.	Rocky Planets	Gas Giants
All of these planets have windy, stormy atmospheres.	Rocky Planets	Gas Giants
These planets are farther from the Sun.	Rocky Planets	Gas Giants

Possible Images for Posters

The following links provide nice images for the posters and for other Gas Giant activities.

Cassini Mission (Saturn)

<http://saturn.jpl.nasa.gov/multimedia/index.cfm>

Planetary Photojournal

<http://photojournal.jpl.nasa.gov/index.html>

Galileo Mission (Jupiter)

<http://galileo.jpl.nasa.gov/gallery/index.cfm>

Astronomy Picture of the Day Search

http://antwrp.gsfc.nasa.gov/cgi-bin/apod/apod_search

Windows to the Universe

http://www.windows.ucar.edu/tour/link=/our_solar_system/solar_system.html

Solar Views

<http://www.solarviews.com/eng/homepage.htm>

Candy Gas Giants Activity

In this activity you and your child will make two edible or non-edible models; one of the Earth and one of their favorite Gas Giant. As you and your child build your two models, help them to explore the difference in **size** and **composition of the layers**. Note that these are rough approximations of the thicknesses of the layers.

What You Need for Edible and Non-edible:

- Various hard candies such as cinnamon disks, butterscotch disks, bubble gum balls and jaw breakers
- Various soft candies such as salt water taffy, cotton candy, tootsie rolls and caramels as well as Rice Krispie Treats, Fruit Roll-ups, etc.
- Miscellaneous craft items such as toothpicks, popsicle sticks, Styrofoam balls, play-doh, tissue paper, construction paper, yarn, pom-poms, pipe cleaners, crayons, glue and scissors
- Planet Comparison Chart

What to Do:

- Invite your child to choose their favorite gas giant and look at the Planet Comparison Chart page to learn about the size and composition of the planet.
- Choose different craft items to represent the different layers of the planets. Remember your two models will be different sizes; Gas Giants are much bigger than Earth!!
- Make your models by helping your child estimate the thicknesses of the planets' layers using the illustration of the layers and the planet's total width on the Planet Chart.

Parent Prompts:

As you and your child are building the two planet models, ask him or her:

Can you name the Gas Giants? Can you name them in order, from the closest to Earth to the farthest from Earth?

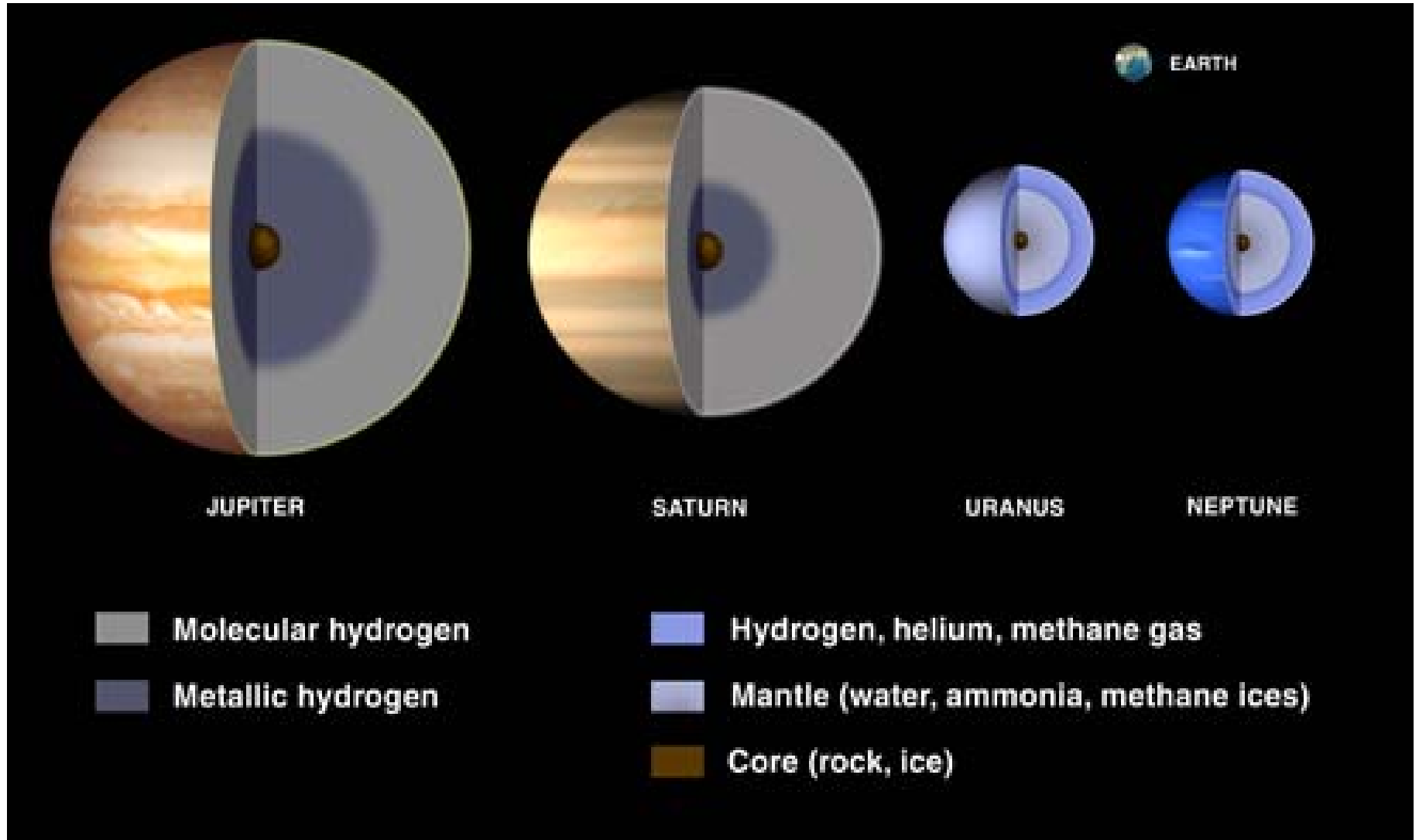
What is the difference between a Gas Giant and a rocky planet like Earth or Mars?

Why did you select this Gas Giant to create? What do you like about it?

What can you tell me about the Gas Giant you are making? What makes it special or different from the others?

How does it compare to Earth?

Planet	Scaled	Composition	
Earth	1 inch across	7925 miles across	
Core	A ball that is 1/2" total <i>across</i>	Iron-Nickle	Not a Gas Giant! A Rocky Planet with water.
Mantle	1/4" thick layer surrounding the core	Silicate, Iron, Magnesium	
Crust	A really really thin layer surrounding the middle	Silicate	
Jupiter	11" across	88,850 miles across	
Core	A ball that is 4" total <i>across</i>	Rocky	The largest Gas Giant.
Middle	6.5" thick layer surrounding the core	Metallic Hydrogen and Helium	
Outer Layer	2.5" thick layer surrounding the middle	Liquid and Gas Helium	
Saturn	9 1/2" across	74,900 miles across	
Core	A ball that is 4" total <i>across</i>	Rocky	The Ringed Planet.
Middle	3-1/4" thick layer surrounding the core	Liquid Hydrogen	
Outer Layer	4-1/4" thick layer surrounding the middle	Hydrogen, Helium	
Uranus	4 inches across	31,769 miles across	
Core	A ball that is 1-1/2" total <i>across</i>	Rocky	May not have layers. A Gas Giant that is tipped on its side.
Middle	2-1/2" thick layer surrounding the core	Water, ammonia, methane fluid	
Outer Layer	3/4" thick layer surrounding the middle	Hydrogen, Helium and Methane	
Neptune	4 inches across	30,775 miles across	
Core	A ball that is 1" total <i>across</i>	Rocky	The bluest Gas Giant
Middle	2-3/4" thick layer surrounding the core	Water, ammonia, methane fluid	
Outer Layer	3/4" thick layer surrounding the middle	Hydrogen, Helium and Methane	



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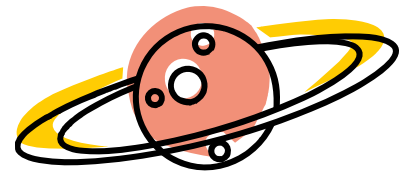
Gas Giant Sun-Catcher

The four gas giants (Jupiter, Saturn, Uranus and Neptune) are all much larger than the four rocky planets (Mercury, Venus, Earth and Mars). Jupiter is the largest planet in our solar system. Around 1,400 Earth's can fit inside Jupiter! Saturn is the second-largest planet in our solar system. Around 764 Earth's could fit inside Saturn. Uranus and Neptune are closer in size to each other than Jupiter and Saturn are. Uranus is 4 times the diameter of Earth and Neptune is 3.88 times the diameter of Earth.

In this activity, you and your child will create sun-catchers in the shape of the four outer planets.

What You Need:

- [Gas giant templates](#)
- Clear contact paper
- Colored tissue paper torn into pieces
- Scissors
- Double-sided tape
- Hole-punch
- Ribbon
- Large popsicle stick



What to Do:

- Cut out two squares of contact paper, each big enough to cover up one of the planets on the Gas Giant template.
- Use double-sided tape to attach one square's clear (non-sticky) side to the planet on the template, and remove the backing from the contact paper.
- Place the pieces of different colors of tissue paper onto the adhesive side of the contact paper so that the tissue paper covers up the planet template.
- Cover the contact paper completely with the other square.
- Cut out your planet. Remove the planet template; you will have a colorful sun-catcher in the shape of the planet.
- Make a hole in the top of the sun-catcher with a hole-punch and attach a piece of ribbon to hang it.
- Repeat the above steps for the other 3 planets (optional).

Parent Prompts:

Which gas giant is the largest?

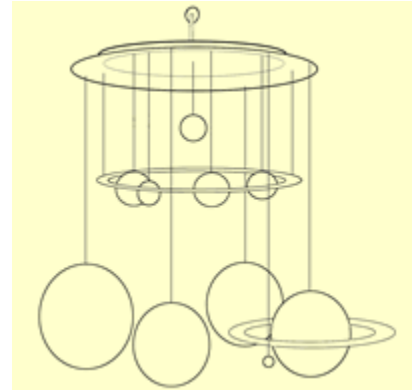
Which two gas giants are similar in size?

Solar System Mobile Activity

With the aid of clues found in “The Solar System I’m Rhyme” song, your child will learn about the characteristics and sizes of the planets in our solar system and create their own “Solar System on a String” mobile.

What You Need:

- White cardstock paper
- Crayons, markers, or map pencils
- Tape
- Large oval Chinette plate
- A large orange pom-pom (for the Sun)
- String
- A pen, pencil, or marker to label the planets
- A large paper clip
- Planets Template
- A copy of the Solar System “I’m” Rhyme



What to Do:

- Invite your children to make a solar system mobile. As you are working, sing or read “The Solar System I’m Rhyme”.
 - Can they identify the Sun, planets, and asteroid belt by their characteristics?*
 - What is the order of the planets?*
 - What are their relative sizes?*
- Provide your child with the planets template and have them *first* color the planets, *then* cut out and label them. Other than the Sun, the planets are correctly scaled relative to each other.
- Give your child a paper plate and mobile template and help them mark on the plate the positions where the Sun, planets, and asteroid belt will be attached.
- Help your child cut the string to the appropriate lengths and attach them to the designated bodies:
 - One – 5-inch string for the Sun*
 - Eight – 10-inch strings for the four inner rocky planets and the asteroid belt*
 - Five – 12-inch strings for the four outer giants and little Pluto*
- Invite them to tape the string ends of each planetary body to the paper plate in the locations marked. The pom-pom Sun belongs in the center. Make sure Jupiter and Saturn are on opposite, outer sides, so that the mobile is balanced.
- To hang the mobile, tape each end of a long piece of string to opposite ends of the plate.

The Solar System "I'm" Rhyme

I'm the one star in this special place.
You'll find me in the center.
Just guess my name to start this game,
then you may surely enter.....

I orbit fast, but s l o w l y turn,
With a 1,416 hour day!
I'm the first. My name is _____,
I'm small and I am gray.

Because my ghastly atmosphere is mainly CO₂,
It's like a scorching greenhouse of 900 degrees. It's true!
My name is _____, I'm yellow and the hottest,
And all I can say is, "Whew!"

I'm glad I'm home to boys and girls,
Even though I do seem "blue",
I'm Planet _____.
and a little larger than Venus (that's your clue!)

I'm reddish-rust, with rocks and dust
And a 24-hour day.
I'm _____ and I am close in size
To Mercury, I'd say!

I'm a band that's full of rocks and dust
That travel in between
The Inner and Outer Solar System's planetary scene.
And because I'm a band of asteroids, I felt,
I should be called The _____.

I'm full of gas, with colorful stripes,
And a really enormous girth.
I am mighty _____ and
I'm over ten times the size of Earth!

I'm yellow and my ammonia haze
covers each and every thing.
I'm _____ and my beauty's
found within my icy rings!

I'm blue and stinky (it's methane gas!).
I have more than twenty moons!
I'm _____, the third gas giant;
A bit larger than neighbor Neptune.

It takes me over sixty thousand days
to go one whole year through!
I'm the last gas giant. I'm old _____,
and just a little darker blue.

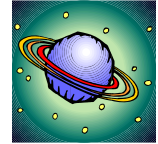
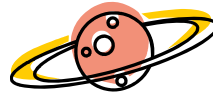
I'm the smallest chunk of icy rock,
but a planet, I will not doubt!
I'm _____, and even though I'm least,
Oh, please don't kick me out!

Where are They? Traveling to the Gas Giants

In this activity, you and your child will learn about the order and size of the four gas giants by using scale models of the planets.

What You Need:

- Poster Board
- Glue
- Scissors
- Crayons
- Images of Sun, Earth, Jupiter, Saturn, Uranus, and Neptune on cardstock
- Images of the Sun, Earth, Jupiter, Saturn, Uranus, and Neptune **to scale** on cardstock, or using poster board:
 - Sun: yellow poster board or butcher paper 110 inches across
 - Earth: 1 inch across
 - Jupiter: 11 inches across
 - Saturn: 9.5 inches across
 - Neptune and Uranus: each 4 inches across
- Dime
- Small peppercorn
- 180 foot long area (the scale of the planets and the distances in this activity can be adjusted; refer to:
http://www.exploratorium.edu/ronh/solar_system/)
- The Solar System "I'm" Rhyme for Gas Giants



What to Do:

- Provide your child with the un-scaled images of the Sun, Earth, and Gas Giants.
Ask your child if he or she can name the objects.
- Invite them to place the planets in order from closest to farthest from the Sun.
Ask your child what is different about the pictures and the real planets. (Answers will vary, but may include that the real planets are balls, not flat pictures, the real planets are much bigger, the real planets are much farther away).
What's missing in this model of the solar system? (Besides Earth, this model is missing the other rocky planets - Mercury, Venus, Mars – and the asteroid belt and Pluto).
- Invite your child to examine the planet images that are to scale and explain that, while the real planets are MUCH larger, these images show the planets at the right proportions. The Sun is 10 times wider than Jupiter, and Jupiter is 11 times wider than Earth.
- Show your child the dime.

What to Do (Cont'd):

Ask your child to pretend that the Sun is as wide as a dime - how big does he or she think Jupiter should be? (Remember that the Sun is 10 times bigger than Jupiter; at this scale, Jupiter would be the size of a very small peppercorn.)

How big would Earth be? (A very tiny grain of sand!)

- Invite your child to show you how far the Sun, Earth, and different Gas Giants are from each other, using the scaled cardstock models. You can be the Sun.

If the Sun was 110 inches across, how far away would Earth be? Have them show you where Earth would be. Close? Far? Really far? (Earth would be almost 1000 feet away!)

- Share a smaller model using the dime.

Ask your child how far they think the Sun, Earth, and different Gas Giants would be from each other if the Sun were the size of the dime, and Jupiter were the very small peppercorn, and Earth is a very tiny grain of sand.

Invite your child to show you. You can be the Sun. Have him/her carry the peppercorn to the distance they think Jupiter should be away from you (Sun). Help him/her adjust the estimated space for Jupiter (31 feet away from you!).

- Walk through the distances to the other planets with your child. If more than one child is participating, have them stand at the appropriate distances.

At this scale:

Sun (0.6 inches, a dime)	0 feet from the Sun!
Earth (0.0061 inches, tiny sand grain)	6 feet from the Sun
Jupiter (0.067 inches, peppercorn)	31 feet from the Sun
Saturn (0.056 inches, peppercorn)	57 feet from the Sun
Uranus (0.023 inches, peppercorn)	115 feet from the Sun
Neptune (0.022 inches, peppercorn)	180 feet from the Sun
Pluto is 237 feet away in this model!	

- Invite your child to think about the sizes of the planets (tiny!) compared to the distances between them (hoooooooooooooooooooooooooooooge!).

Can the "Earth" see Jupiter? (Jupiter can be seen in our sky sometimes, but it is a very small "dot" the size of the stars in the night sky.)

Does anything about the model surprise the children?

- Take turns between you and your child reading the *Solar System I'm Rhyme*. If more children are involved, have them stay in their "planetary" place and sing the song out loud, one at a time, each for their planet.

The Solar System "I'm" Rhyme

With a concentration on the Gas Giants

I'm the one star in this special place.
You'll find me in the center.
Just guess my name to start this game,
then you may surely enter.....

I'm glad I'm home to boys and girls,
Even though I do seem "blue",
I'm Planet _____.
and a little larger than Venus (that's your clue!)

I'm full of gas, with colorful stripes,
And a really enormous girth.
I am mighty _____ and
I'm over ten times the size of Earth!

I'm yellow and my ammonia haze
covers each and every thing.
I'm _____ and my beauty's
found within my icy rings!

I'm blue and stinky (it's methane gas!).
I have more than twenty moons!
I'm _____, the third gas giant;
A bit larger than neighbor Neptune.

It takes me over sixty thousand days
to go one whole year through!
I'm the last gas giant. I'm old _____,
and just a little darker blue.

Storms on Jupiter

We've seen storms on most of the planets in our solar system. A famous storm on Jupiter is called the "Great Red Spot." The storm is a huge, spinning hurricane. It's so big that two to three Earth's could fit inside of it! This storm has been going on for hundreds of years! Some scientists believe that the storm has lasted so long because it never goes over land – Jupiter is made of gas – so there is nothing to slow it down.

In this demonstration activity, your child will see how the clouds swirl around in a storm and compare them to the Great Red Spot's movement.

What you Need:

- Large round pan or bowl
- Water
- Corn starch
- Spoon
- Video of the Great Red Spot in color
- Video of the Great Red Spot in black and white



What to Do:

- Sprinkle a little cornstarch into the bowl.
- Pour water into bowl until it's about 3 inches deep.
- Stir water and cornstarch together until the clumps are gone.
- Once the water is still and the cornstarch has settled to the bottom, run the tip of the spoon straight across the pan.
- Compare what you see to the video of the Great Red Spot.

Parent Prompts:

*What do you see when you run the spoon across the pan?
(Hurricane-like eddies form to either side of the spoon.)*

Does what you see look like the pattern you seen on Jupiter in the Great Red Spot? (Yes!)

Make a Model of Saturn

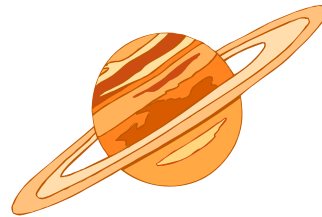
Saturn is known for its beautiful rings. Those rings are made up of chunks of ice and rock!

In this activity, you and your child will make a model of Saturn and its icy rings using a Styrofoam ball and a paper plate.

Modified from: http://spaceplace.nasa.gov/en/kids/cassini_make2.shtml.

What You Need:

- One 2-inch diameter Styrofoam ball, carefully cut in half
- One paper plate
- 2 or 3 wooden toothpicks
- Glue
- Glitter
- Scissors
- Hole punch
- Small paper clip
- String or ribbon



What to Do:

- Cut a hole in the center of the paper plate that will fit around the Styrofoam ball tightly.
- Decorate the Styrofoam ball with the tissue paper and glue and let dry while you create the rings.
- Create rings around the edge of the paper plate on the front and back using the glue and glitter.
- Insert the Styrofoam ball into the center of the paper plate.
- Stick a bent paperclip into the middle of the Styrofoam ball and tie a string or ribbon to it for hanging purposes.

Parent Prompts:

What is Saturn actually made of? (Mostly the gases hydrogen and helium.)

What are its rings made of? (Mostly small icy particles – about the size of a dime to the size of a car, though some may be bigger.)

How big are Saturn's rings?

Are Saturn's rings thick like a donut, or thin like a dvd?

Share that the rings are as wide as the distance from Earth to the Moon – about 155,000 miles wide! But they are very, very thin – only a half mile in thickness.

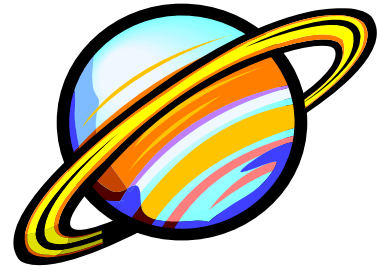
Saturn's Rings Flip Book

After nearly 7 years of traveling from Earth through space, the Cassini spacecraft entered orbit around Saturn in June of 2004! It has been revealing new information about this gas giant planet ever since! You and your child are going to learn about different parts of Saturn as you make a flip book.

This activity is adapted from *Reading, Writing, and Rings*, Jet Propulsion Laboratory, NASA (EG-2004-03-012-JPL) <http://saturn/jpl.nasa.gov>

What You Need:

- Saturn's rings, surface, interior and core templates
- Scissors
- Crayons
- Glitter and other craft items, such as yarn, star stickers, glow-in-the-dark paint, etc.
- Glue
- Reading materials related to Saturn
- 1 piece black construction paper
- Stapler



What to Do:

- You will read a story about Saturn aloud to your child as he or she colors the pages to the flip-book, starting with the rings of Saturn.
- When your child is done coloring, help him or her write down one thing (or more!) they learned about Saturn's rings from your reading. Use the space provided on the Saturn's rings page.
- Cut around the rings on the lines indicated – your child may need help here. Cut out the center of the rings.
- Repeat the reading, coloring, writing, and cutting for Saturn's surface, and interior.
- When all of the levels are completed, put them together so that the bottom edges of the pages line up.
- Place a piece of 8 ½ x 11" black construction paper behind the pages and staple them together so that a booklet is formed.
- Invite your child to decorate the black construction paper using the craft materials. This is the space around Saturn.
- When the booklet is completed, the interior of Saturn can be slipped through the rings to hold the pages together.

About Saturn (Read aloud to your child as they color)

Saturn is the sixth planet from our Sun. Because it is so far away from the Sun, it does not get much sunlight and is very, very cold. Because it is so far away, it takes Saturn 30 years to go around the Sun! Earth only takes one year to go around the Sun.

No person has ever even visited Saturn – so what we know about the planet is from our observations through telescopes and through spacecraft that have gone by Saturn.

A special mission is now studying Saturn – the Cassini Mission. Because Saturn is so far away, it took the Cassini spacecraft almost 7 years to get to Saturn from Earth. How old are you?

Rings

You might think there are only two rings around Saturn, but there are hundreds! The rings are very wide but very thin. The rings are 185,000 miles wide, but only a little over a half a mile thick. That's like Earth having rings that stretch almost all the way to the Moon (which is a bit farther away at 250,000 miles).

The rings are very beautiful. Some are twisted, some are braided. There are small moons in the rings. The rings are made of chunks of water ice and ice-covered rock. Some of the chunks are the size of a sand grain. Some are the size of a house!

Outer Layers

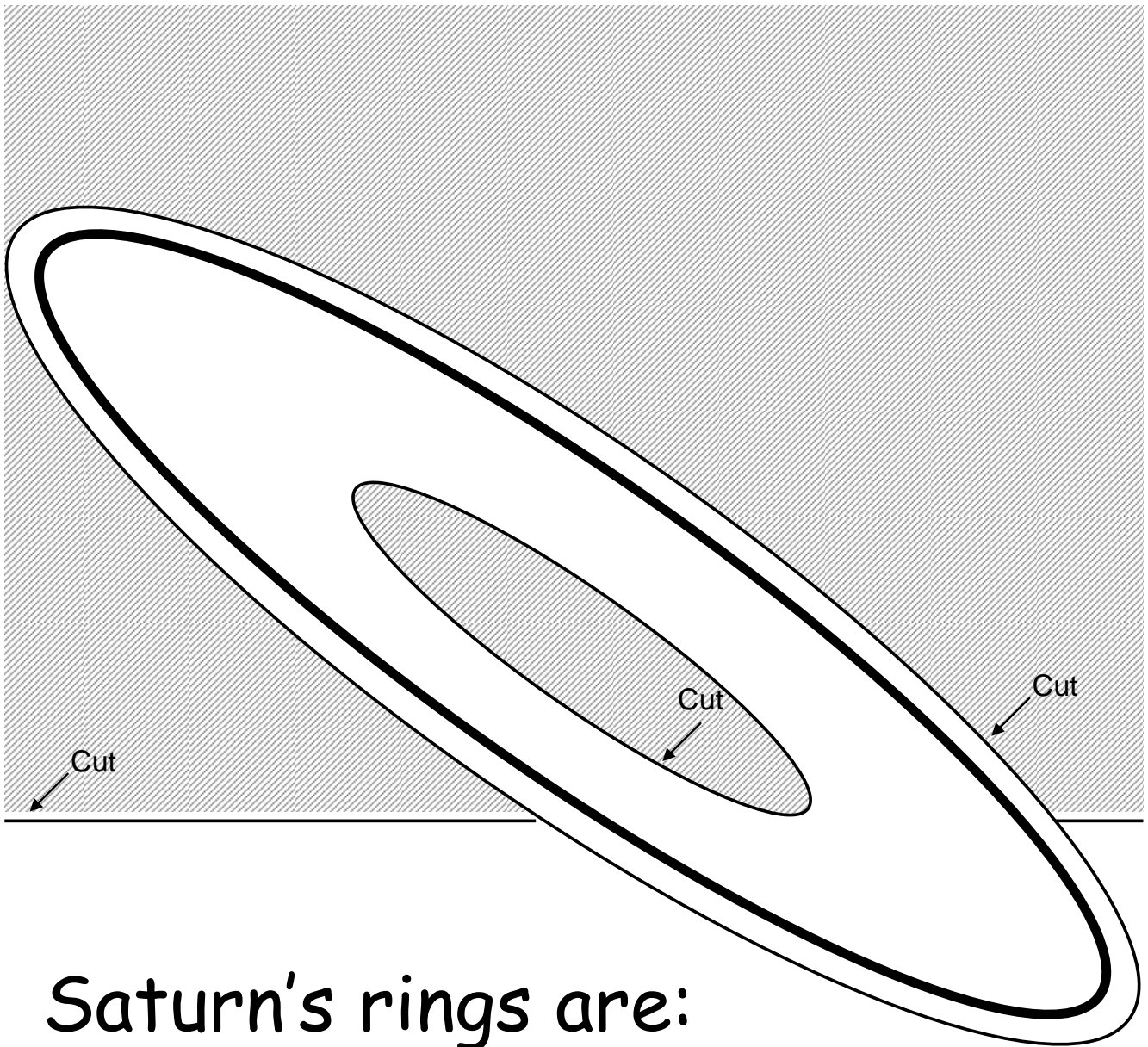
Saturn is covered with thick clouds. The top layer is very cold and there are many storms in Saturn's thick clouds – the white spots on Saturn's surface may be storms. Saturn is very windy. Winds reach more than a thousand miles an hour!

Because it is so windy, the clouds move. The moving, swirling clouds make Saturn look striped with yellow and gold bands.

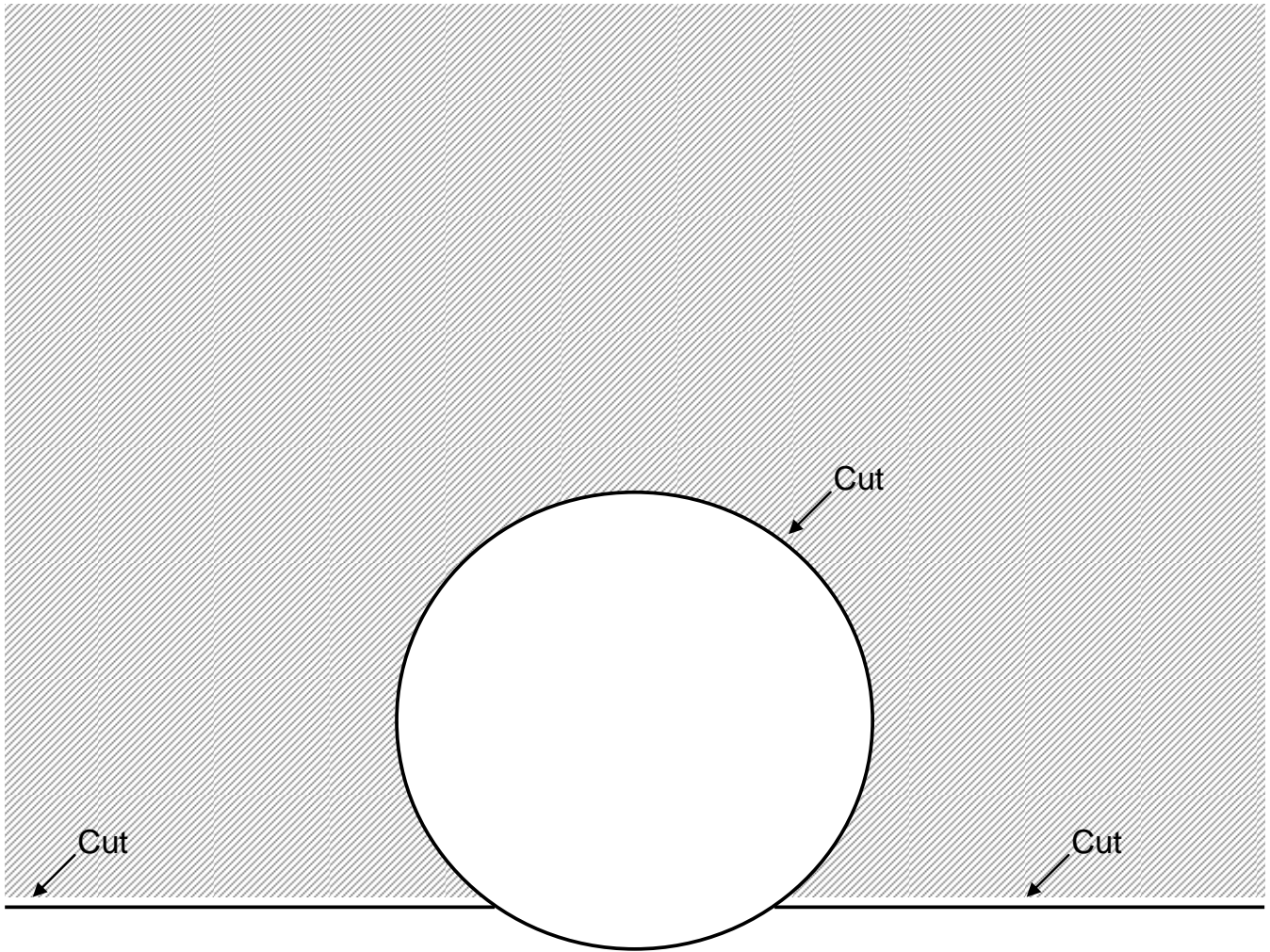
Saturn is made mostly of gas – hydrogen and helium. It is a giant ball of gas. If you got close to Saturn and tried to put your hand on its surface, your hand would go right through!

Inner Layers

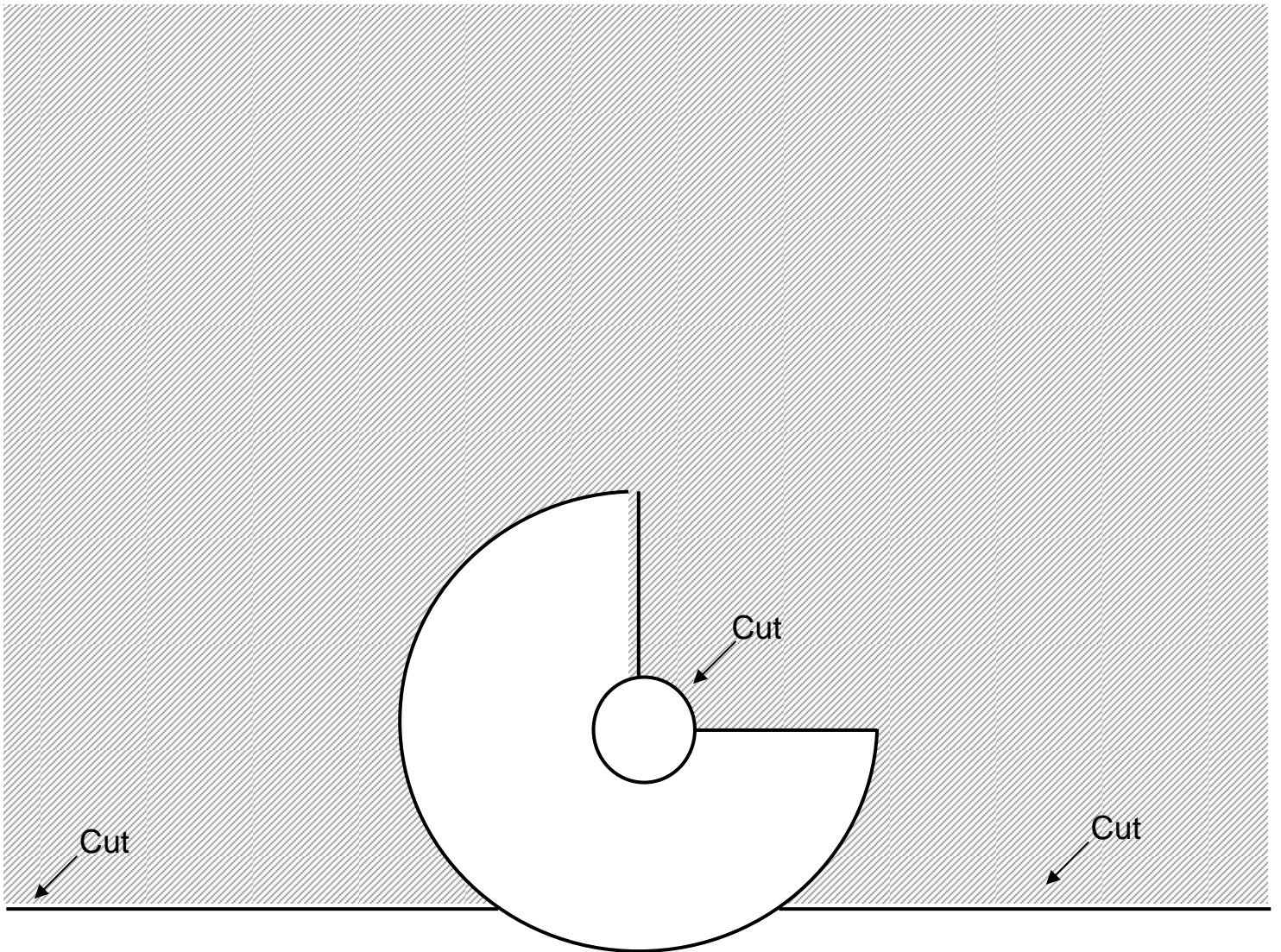
The very center of Saturn is called the core. Scientists think that Saturn has a rocky core. Some scientists think that the temperatures in Saturn's core are so hot that the rock is actually melted!



Saturn's rings are:



Saturn's surface is:



Saturn's core is:

Coloring Sheets and Games

The following are links to different coloring sheets and games:

Enchanted Learning – Jupiter

<http://www.enchantedlearning.com/subjects/astronomy/activities/coloring/Jupiter.shtml>

Enchanted Learning – Saturn

<http://www.enchantedlearning.com/subjects/astronomy/activities/coloring/Saturn.shtml>

Enchanted Learning – Uranus

<http://www.enchantedlearning.com/subjects/astronomy/activities/coloring/Uranus.shtml>

Enchanted Learning – Neptune

<http://www.enchantedlearning.com/subjects/astronomy/activities/coloring/Neptune.shtml>

Enchanted Learning – Earth

<http://www.enchantedlearning.com/subjects/astronomy/activities/coloring/Earth.shtml>

Ed Helper – Jupiter Word Find

<http://edhelper.com/SolarSystem1065.htm>

Ed Helper – Saturn Word Find

<http://edhelper.com/SolarSystem1066.htm>

Ed Helper – Uranus Word Find

<http://edhelper.com/SolarSystem1067.htm>

Ed Helper – Neptune Word Find

<http://edhelper.com/SolarSystem1068.htm>

Ed Helper – Earth Word Find

<http://www.edhelper.com/SolarSystem1063.htm>

Explore Gas Giants!

Websites

<http://saturn.jpl.nasa.gov/home/index.cfm> - NASA's official Cassini-Huygens mission to Saturn/Titan Web site with mission info, images, and more. Check out the ideas for activities on the "Kids" page at:

<http://saturn.jpl.nasa.gov/kids/index.cfm>. The photographs of the mission highlights are worth a stop as well (<http://saturn.jpl.nasa.gov/multimedia/poll/index.cfm>).

http://www.windows.ucar.edu/cgi-bin//tour_test_milagro1/link=/our_solar_system/solar_system.html&edu=elem - Window's to the Universe contains interesting information on all of the gas giants for elementary age children. The site includes space mission information, images, and gas giant moon facts.

http://starchild.gsfc.nasa.gov/docs/StarChild/solar_system_level1/planets.html - StarChild is for young astronomers. Each planet – including the gas giants – is explored through text and pictures and is followed by a question or two to challenge what your child learned.

<http://solarsystem.nasa.gov/planets/index.cfm> - A detailed fact sheet about the planets and their moons, images, mission info, and a "kids-eye-view" of all four gas giants can be found at this site for ages 8 and up.

<http://kids.msfc.nasa.gov/Sites/ExternSite.asp?url=%2FSolarSystem%2FPlanets%2F> – While the gopher mascot is annoying, NASAkids offers links to other sites about the gas giants, including some links to activities and games.

<http://www.nineplanets.org/> - The Nine Planets offers background information and additional resources about the Gas Giants for young adults and adults.

<http://nssdc.gsfc.nasa.gov/planetary/planets/> - a collection of resources for young adults and adults about NASA's missions to specific planets – including the Gas Giants.

Books

Me and My Place in Space. Joan Sweeney, 1999, Dragonfly Books, ISBN 0517885905. The wonders of space as seen through the eyes of a young girl, provides the backdrop for Sweeney's introduction to our solar system for young children ages 4–8. Clear, colorful drawings and diagrams and easy-to-read text make this a fascinating first adventure into space.

Saturn. Seymour Simon, Harper Trophy, 1988, ISBN 0688084044. For ages 4-8. A look at Saturn with its magnificent rings and moons.

Our Universe Series. Margaret Goldstein and Laura Waxman, Lerner Publications Company, 2003, ISBN 0822547651.

For Pre-K and ages 5-7. The gas giants are covered in four different easy-to-understand books with photographs. Mission highlights, facts about the planets and a "learn more about each planet" section" is included in each.

Gas Giants. Brian Knapp, Grolier Publishing, 2004, ISBN 0717258300.

For ages 6-12. A detailed account of all four of the gas giants and their satellites. Children can explore the many features of the planets, including mission facts.

Voyager: An Adventure to the Edge of the Solar System. Crown Publishers, 1992, ISBN 0517581574.

For ages 7-10. An account of what the Voyager probes taught us about the four gas giant planets and their respective rings and moons.

Our Solar System. Seymour Simon, William Morrow & Company, 1992, ISBN 0688099920.

For ages 7-12. An overview of the solar system with full-color photographs and illustrations. Each of the planets – including the gas giants - gets several pages of coverage.

All About the Gas Giants

- The four gas giants in our solar system are Neptune, Uranus, Saturn, and Jupiter. These are also called the Jovian planets.
- "Jovian planet" refers to the Roman god Jupiter and was intended to indicate that all of these planets were similar to Jupiter.
- Jupiter is about 11 times the diameter of Earth, Saturn 9 times, and Uranus and Neptune about 4 times Earth's diameter.
- A gas giant is a GIANT planet that is made of gas! They are different from rocky or terrestrial planets that are made of mostly rock.
- Unlike rocky planets, gas giants do not have a well-defined surface – there is no clear boundary between where the atmosphere ends and the surface starts!
- The gas giants have atmospheres that are mostly hydrogen and helium.
- All four planets rotate relatively rapidly – while Earth spins once on its axis every 24 hours, Saturn spins once every 10 hours.
- Like Earth, all the gas giants have wind bands. These are seen as east-west stripes. Jupiter has the most well defined bands.
- Gas giants may have a rocky or metallic core but the majority of their mass is in the form of gas (or gas compressed into a liquid state – to get an idea of what this could be like, think of liquid mercury in a thermometer).
- Jupiter and Saturn probably have liquid metallic hydrogen interiors (liquid hydrogen conducts electricity).
- Scientists believe Uranus and Neptune have interiors that contain a mixture (or layers) of rock, water, methane, and ammonia.
- All four gas giants have rings and moons. Saturn's rings, made of mostly ice, are the most spectacular, and the only ones known before the 1970s. As of 2004, Jupiter was thought to have the most moons, with more than sixty discovered!