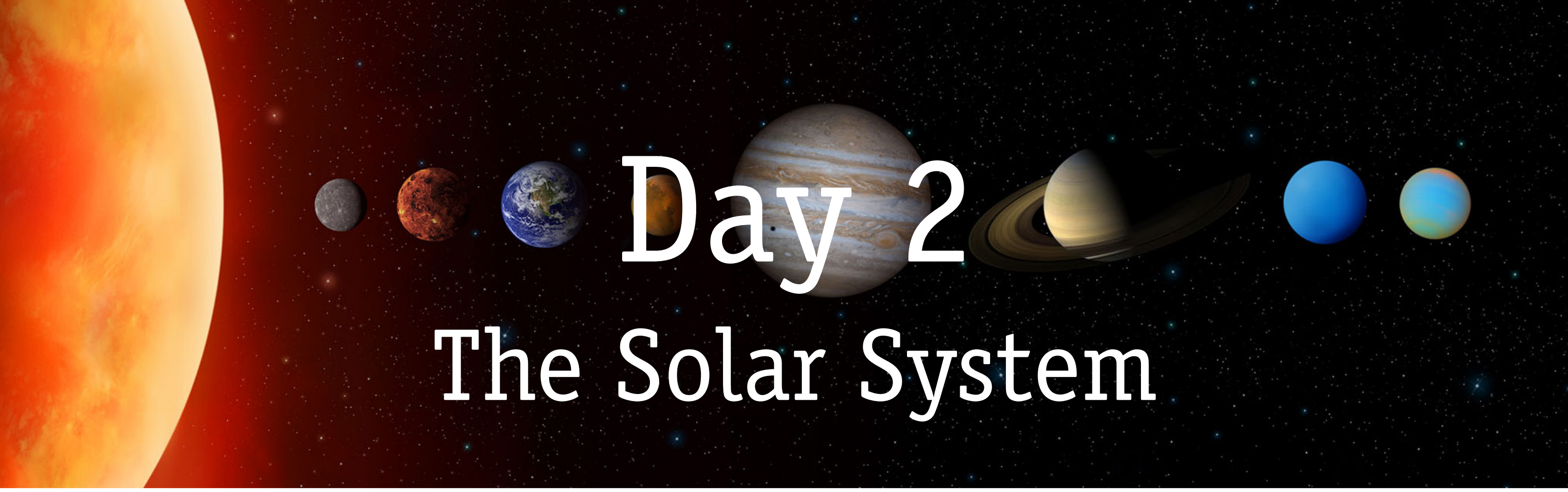
Day 2

The Solar System



Day 2
The Solar System

Introduction

The solar system is our **Sun** and *everything* that travels around it. There are **planets**, **moons**, **comets**, **asteroids,** and even dust and gas. All these objects travelling around the Sun are held in the Sun's **gravity**, making the Sun the center of the solar system. Even though the distances between the Sun and the planets are enormous, gravity is great enough to hold the planets in **orbit** around the Sun.

Questions to guide explorations and experiments

- What is the solar system?
- What is a planet? What planets are in the solar system?
- Why do the Earth and other planets revolve around (orbit) the Sun?
- What else revolves around the Sun?
- How big is the solar system? How big are all the planets?

Books and activities

- **Books:** fiction, nonfiction and poetry all about our solar system
- **Activities:** explore the size of the planets in our solar system and how far they are from the Sun

Children's Books

Fiction

- *The Lizard and the Sun / La Lagartija y el Sol* by Alma Flor Ada (Ages 4-8)
- *Pluto Is Peeved: An Ex-Planet Searches for Answers* by Jacqueline Jules (Ages 6-9)
- *Miss Tracy Is Spacey!* by Dan Gutman (Ages 6-9)
- *Stink: Solar System Superhero* by Megan McDonald (Ages 4-8)
- *Zathura* by Chris Van Allsburg (Ages 4-8)

Poetry

- *Comets, Stars, the Moon, and Mars: Space Poems and Paintings* by Douglas Florian (Ages 6-9)
- *The Day the Universe Exploded My Head* by Allan Wolf (Ages 9-12)

Biography

- *Caroline's Comets: A True Story* by Emily Arnold McCully (Ages 6-9)
- *Nicolaus Copernicus: The Earth Is a Planet* by Dennis Fradin (Ages 9-12)
- *Galileo's Universe* by J. Patrick Lewis (Ages 9-12)
- *I, Galileo* by Bonnie Christensen (Ages 6-9)
- *The Librarian Who Measured the Earth* by Kathryn Lasky (Ages 9-12)
- *The Planet Hunter: The Story Behind What Happened to Pluto* by Elizabeth Rusch (Ages 4-8)
- *Starry Messenger: Galileo Galilei* by Peter Sis (Ages 6-9)

Nonfiction

- *Comets, Meteors, and Asteroids: Voyagers of the Solar System* by Ellen Lawrence (Ages 6-9)
- *Exploring Our Solar System* by Sally Ride and Tam O'Shaughnessy (Ages 9-12)
- *Gravity* by Jason Chin (Ages 6-9)
- *Little Kids' First Big Book of Space* by National Geographic Kids (Ages 4-8)
- *The Magic School Bus Lost in the Solar System* by Joanna Cole (Ages 6-9)
- *Magic School Bus Presents: Our Solar System* by Tom Jackson (Ages 6-9)

Children's Books

Nonfiction

- *Me and My Place in Space* by Joan Sweeney (Ages 4-8)
- *Our Solar System* by Seymour Simon (Ages 6-9)
- *The Planets* by Gail Gibbons (Ages 6-9)
- *The Planets in Our Solar System* by Franklyn Branley (Ages 4-8)
- *Professor Astro Cat's Solar System* by Dr. Dominic Walliman (Ages 6-9)
- *Science Comics: Solar System: Our Place in Space* by Rosemary Mosco (Ages 9-12)
- *The Sun Is Kind of a Big Deal* by Nick Seluk (Ages 4-8)
- *The Sun: Our Nearest Star* by Franklyn Branley (Ages 4-8)
- *What Makes Day and Night?* by Franklyn Branley (Ages 4-8)

Online fact sheets

Small Worlds, Big Discoveries! by NASA

https://spaceplace.nasa.gov/review/posters/small-bodies/small-bodies-factsheet.pdf

Asteroids: Space Rocks with a Story by NASA (also available in Spanish)

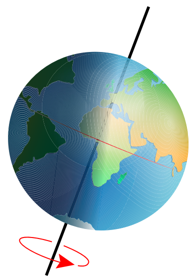
https://spaceplace.nasa.gov/review/posters/stardust/asteroids_fun_sheet.pdf

https://spaceplace.nasa.gov/review/posters/stardust/asteroids_fun_sheet_spanish.pdf

Space Words

Asteroid
A rocky space object that can be a few feet wide to several hundred miles wide. Most asteroids in our solar system orbit in a belt between Mars and Jupiter.

Axis
An imaginary line that goes through a planet's center from top to bottom. A planet spins (rotates) around its own axis.



Comet
A frozen mass of gas and dust that orbits the Sun and may form a long, bright tail when it is flying close to the Sun.

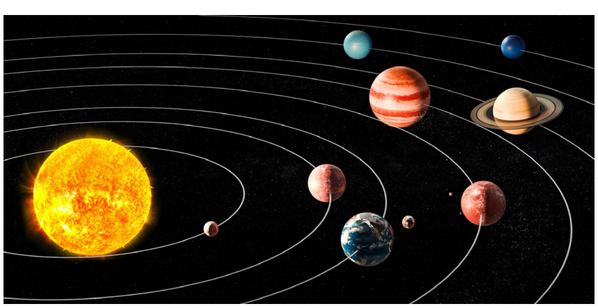
Dwarf planet
A non-satellite body that is in orbit around the Sun, has sufficient mass to have a nearly round shape, but is not the dominant body in its orbit.

Elliptical orbit
The oval (not round) pattern that describes how the planets in our solar system move around the Sun.

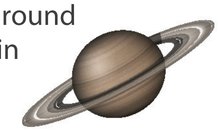
Gravity
A force that pulls matter together; a force that pulls people and objects toward the ground.

Moon
A natural satellite that orbits a larger object. Earth has one Moon, the one we see in the night sky.

Orbit
The curved path followed by an object in space as it goes around another object; to travel around another object in a single path.



Planet
A celestial body that (1) is in orbit around the Sun, (2) has sufficient mass to have a nearly round shape, and (3) it is the dominant body in its orbit.

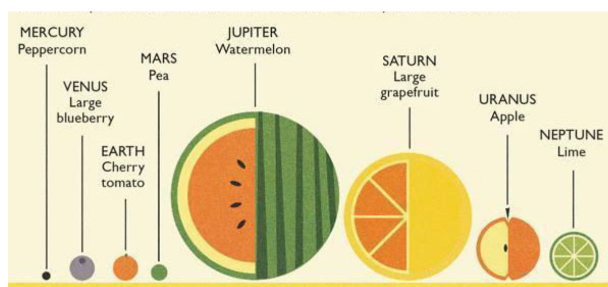


Revolve
To move in an orbit or circle around a fixed point. The Earth revolves around the Sun.

Rotate
To turn around a center point—or axis, like a wheel turns on a bicycle. The Earth rotates from day to night.

Satellite
An object that orbits another object. A moon is a natural satellite.

Scale
Scale is the implied relationship (or ratio) between a model and the actual object. A scale model is a representation of an object that is larger or smaller than the actual size of the object being represented.



Solar system
The Sun and all of the planets, comets, asteroids, and other space bodies that revolve around it.

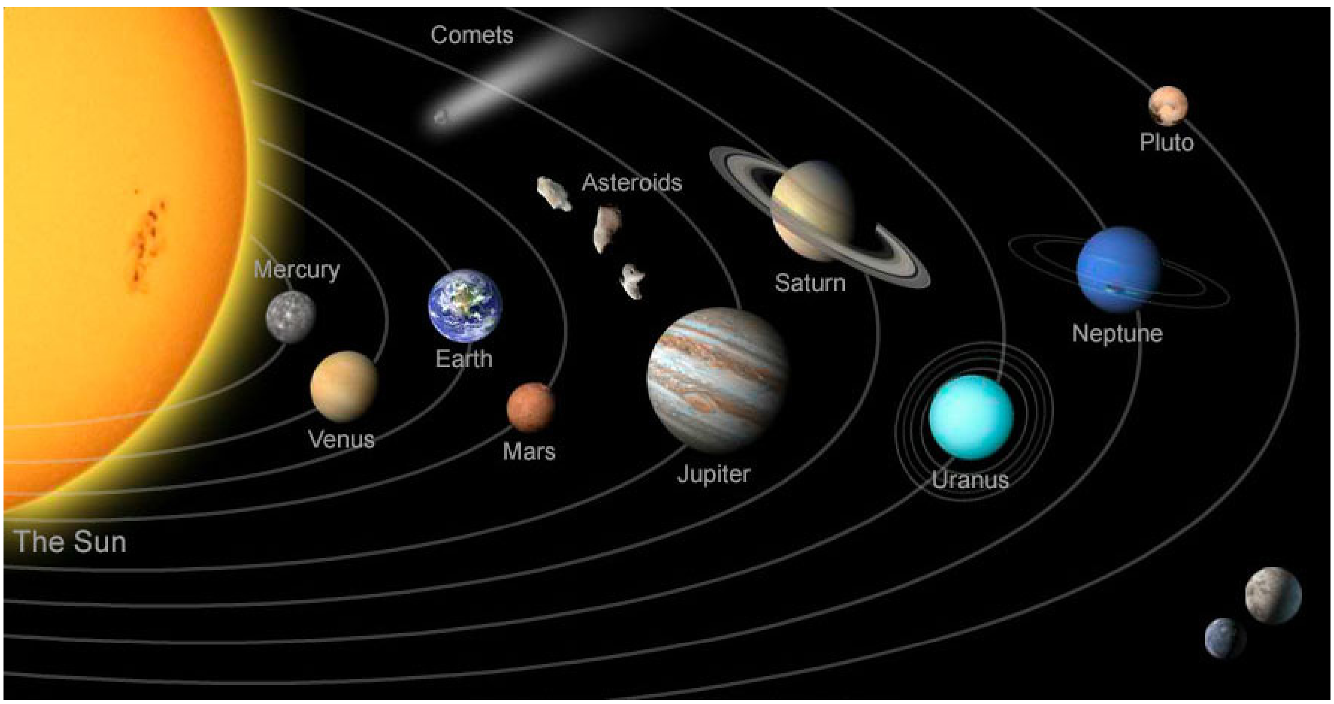
Star
A giant ball of hot gas that emits light and energy created through nuclear fusion at its core.

Sun
The star in the center of our solar system. Like all stars, the Sun is composed of a great burning ball of gases. It is made of 92.1% hydrogen and 7.8% helium.

Activity 1: Solar System Model (Distance)

Introduction

Our **solar system** is the **Sun** and everything that travels around it. Traveling around the Sun are eight official **planets**, at least five **dwarf planets**, nearly 200 **moons** (or natural satellites of the planets), and a large number of **comets** and **asteroids**.



Supplies

- Tape measure
- Rolls of toilet paper
- Index cards or paper
- Markers
- Tape
- Solar System Statistics cards
  (See printable cards after page 45. The cards are set up to print double-sided.)

Activity 1: Solar System Model (Distance)

Get kids thinking

Our solar system is BIG! The sizes of the planets vary greatly as do the distances between planets and their distance from the Sun. Start by asking about distances kids have traveled.

- How many miles is it from home to school? How much time does the trip take?
- How long would it take and how many miles would you have to travel from where you live to get to London, England, or to La Paz, Bolivia? What about to Mars?

Let's get started!

Mars is relatively close to Earth, while the Sun and other planets even farther away. Talk about scale and how good a way to show the vast distances among the planets is to make a scale model that is smaller than the actual size of the solar system.

Talk about the planets with the kids.

Step 1: Identify the planets

Ask kids: Can they can name all the planets in the solar system?

- As you **name them** together, have kids **write each planet name** down on its own index card or small piece of paper along with the average distance (in miles) of each planet from the Sun. These are big numbers, so share the distance chart on page 31 to help.
- Instead of writing, kids can cut out and use the Solar System Statistics cards. (See printable cards after page 45. The cards are set up to print double-sided.)
- Once you have cards for each planet, have kids put them in order from nearest the Sun to farthest.

Activity 1: Solar System Model (Distance)

Step 2: Decide on the scale for your model

Toilet paper sheets are going to represent the distances of planets from the Sun in this model. What's fun about making this model is deciding the scale. If you have a lot of space , consider a scale of 10,000,000 (10 million) miles equals 1 square of toilet paper. That will put Neptune about 1,100 sheets or 94 feet away from your "Sun." (See the **Expanded Distance Table** on the fiollowing page if you plan to use this scale.)

- As you think about your scale, ask kids to estimate space available for the model.
- Have them measure a square of toilet paper and predict if their model will fit into the available space.
- Provide kids with a copy of the **Expanded Distance Table**. The table is for this scale: **10,000,000 miles = 1 square of toilet paper** (95 feet of floor or outdoor space needed)

Alternative scale options

If you do not have access to 95 feet of room, you can calculate the numbers for a scale that requires only about 20 feet of space. This is a good math challenge for kids who like to do calculations! 50,000,000 miles = 1 square of toilet paper (19 feet of floor or outdoor space needed)

For younger kids, you can use this simplified chart below:

Planet	Squares	Average distance from Sun
Mercury	2.0	36 million miles
Venus	3.7	67 million miles
Earth	5.1	93 million miles
Mars	7.7	142 million miles
Jupiter	26.4	484 million miles
Saturn	48.4	888 million miles
Uranus	97.3	1.8 billion miles
Neptune	152.5	2.8 billion miles

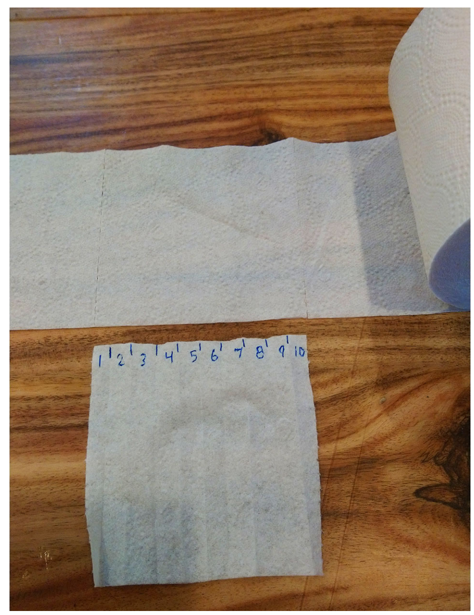
Expanded Distance Table **10,000,000 miles = 1 square of toilet paper** (95 feet of floor or outdoor space needed)

PLANET	True Average Distance to the Sun in Miles	Rounded Average Distance to Sun in Miles	Distance to Sun in Sheets* (10,000,000 miles/ sheet) * 4-inch toilet paper squares	Distance to Sun in Inches	Distance to Sun in Feet	Distance Between Each Planet in Sheets
MERCURY	35,983,610	36,000,000	3.6	14.4	1.2	
VENUS	67,232,360	67,000,000	6.7	26.8	2.3	
EARTH	92,957,100	93,000,000	9.3	37.2	3.1	
MARS	141,635,300	142,000,000	14.2	56.8	4.7	
JUPITER	483,632,000	484,000,000	48.4	193.6	16.2	
SATURN	888,188,000	888,200,000	88.8	352.2	29.6	
URANUS	1,783,950,000	1,800,000,000	180	720	60	
NEPTUNE	2,798,842,000	2,800,000,000	280	1,120	93.3	

Activity 1: Solar System Model (Distance)

Step 3: Make your model

- Make an index card for the Sun (or a construction paper Sun) and secure it on the ground (with tape if you are inside, set a rock on top of it if you are outside).
- Attach the toilet paper to the index card with tape.
- Lay the toilet paper down, slowly walk and unroll the toilet paper. (If you are outside and it is even a little windy, get some rocks to hold the toilet paper in place.)
- As you unroll, count the number of squares.
- When you reach Mercury (3.6 sheets on a 10,000,000 mile scale), use a marker to make a dot on the toilet paper and secure the Mercury card next to that square.
- If you want to be precise about where to put the dot, turn a square of toilet paper into a tool that can help. (See photo on the right)
- Continue unrolling the toilet paper and placing the planet cards until you get all the way to Neptune! Far out, right?



For an added challenge

Ask kids if they have a plan for keeping track of their mileage.

For example, Venus is 6.7 sheets from the Sun, but only 3.1 sheets from Mercury. Will they count sheets from the Sun for each planet? See if they can calculate the number of sheets between each planet and add that information to their distance chart. Or, find out if they have another idea to keep their model accurate.

Activity 1: Solar System Model (Distance)

Step 4: Talk about your model

Now that kids have an idea of the relative distance between planets, what do they think?

Ask kids:

- Why is it important to know these distances?
- Who is it important to?
- How do the distances between planets get measured?
- What units are the best units for measuring these distances?

As you discuss, be sure to explain to kids that the distances they used to create their model represent the planets *average distances* from the Sun.

- Planetary **orbits** are **elliptical** and not circular, so the distances change depending on the planet's orbit.
- Also, be sure to point out that orbiting planets are never all in a straight line going out from the Sun as they are represented in this toilet paper model.
- And worth sharing: astronomers measure distances in the solar system in "astronomical units" or AU. 1 AU = 93 million miles, the distance from the Sun to the Earth.
- Talk about what a solar system model that demonstrates the relative average distances between the planets and the Sun and the relative sizes of the planets would look like.

Save your Solar System Statistics cards for future activities.

More model solar system activities

Scale Model of our Solar System (University of Manitoba)
https://umanitoba.ca/observatory/outreach/solarsystem/

The Thousand-Yard Model or, the Earth as a Peppercorn (National Optical Astronomy Observatory)
https://www.noao.edu/education/peppercorn/pcmain.html

Solar System Bead Activity (NASA)
https://www.jpl.nasa.gov/edu/teach/activity/solar-system-bead-activity/

Activity 2: Sizes in the Solar System

Introduction

The sizes of the **planets** relative to each other and the distances between them are very large. This makes a true **scale** model of the solar system really difficult to make. Either the planets are correct in size but too close together, or the distances between them are correct but the planets are too small to see. Kids can get a sense of the relative sizes of the planets when they create models of the objects in our solar system.

Supplies

- Collection of different sized balls: ping pong, golf, tennis, basketball, soccer, a really big exercise ball
- Different-sized marbles
- Different-sized ball bearings
- Other round objects of different sizes, including beads, pebbles, pinheads, etc.
- Buttons, coins, bottle caps, frisbee
- A few grains of sand, poppy seeds, salt

"Sizing up the Solar System" chart (for each child)

- Ruler
- Yellow craft paper (optional)
- Paper
- Drawing compass
- Markers
- Scissors
- Tape

Access to a basketball court makes this activity easier.

Activity 2: Sizes in the Solar System

Get kids thinking

Watch: Watch This Guy Build a Massive Solar System in the Desert
https://youtu.be/Kj4524AAZdE

Let's get started!

Step 1: Choose objects for your model

Spread out all the round objects you have and get kids exploring and talking about the objects. **Ask kids:**

From what you've read and learned about the planets, what objects best represent the planets' size in relationship to each other?

- Which planet is the largest and smallest?
- What object here is the largest? Smallest?
- Most nearly the size of Earth?
- What's the biggest thing in the solar system?
- How big is an asteroid compared to a planet?

After getting close up with the objects, have kids record their ideas about relative size in the Sizing Up the Solar System chart (see page 40).

Using the ideas they've recorded,

- Have kids lay out the objects they chose to represent bodies in the solar system and explain their choices.
- Have them look at their Solar System Statistics cards and put the planets in order from smallest to largest.

Ask kids: How well does what you know about actual planet size match up with the relative sizes of the objects you chose to represent the planets?

Activity 2: Sizes in the Solar System

Step 2: Think about diameter

Now that kids are thinking about actual size and scale size proportions, together as a group make a solar system model using scaled diameters. The table below includes the Sun, planets, and other bodies shown to scale in size proportions. On this scale:

- The Sun will be about 12 feet in diameter — the size of the center circle on a basketball court!
- Mars will be the size of a penny
- The Vesta asteroid is a grain of sand.

Have kids look over the scaled diameters and think about the round objects they examined earlier. **Ask kids:** Which objects are a good fit for this model? How can you tell?

	True Diameter in Miles	Aproximate Scaled Diameter Diameter in Inches
Sun	864,938	144
Mercury	3,032	0.5
Venus	7,521	1.25
Earth	7,926	1.3
Earth's moon	2,159	36
Vesta asteroid	329	.05
Mars	4,222	7
Jupiter	88,846	14.8
Saturn	74,898	12
Uranus	31,763	4.8
Neptune	30,778	4.7
Pluto	1,473	0.23

Activity 2: Sizes in the Solar System

Head to the nearest basketball court to build your model.

- Use yellow craft paper to cover the center court circle to represent the Sun. Have kids write facts about the Sun and questions they still have right on the Sun's surface.
- Kids should select objects they think could represent the other bodies in the solar system model.
- Have them measure the objects to see if they match the scaled diameters. If they can't find an appropriately sized object, have them use a compass to draw one.
- Secure small objects on paper so they can be labeled and seen!
- Kids should write facts and questions they still have for each body.
- Add the objects to the model by placing them in order next to the Sun.

Step 3: Use your model to think about the solar system

When all the pieces of the solar system are in place, **ask kids:**

- What are some of the main differences of the objects in the solar system?
- What is similar about all the planets?

As you discuss, you'll want talk about the differences in size and composition:

- Five planets are solid
- Four planets — Saturn, Jupiter, Uranus and Neptune — are made of gas
- The atmospheres and temperatures of every planet are different
- All planets are spherical, rotate on their axes, and revolve around the Sun in the same direction (counterclockwise)
- In addition to revolving around the Sun, each planet also spins, or rotates, on its own axis.

Activity 2: Sizes in the Solar System

Step 4: Make your model MOVE!

Orbiting the Sun

Time to get your model moving! Have kids get their Solar System Statistics cards and look at the rotational periods and orbital periods for the planets. Start with Earth. **Ask kids:**

- What looks familiar about those numbers?
- How do we refer to those periods of time?
- Have them compare Earth's day and year with the rotational periods and orbital periods of other planets.
- And what's Earth's moon doing?

Demonstrate the differences in orbital periods with Earth and Mars. Mars takes almost twice as long to orbit the Sun as the Earth.

- Have two kids represent Earth and Mars and make their year-long trip around the Sun.
- Mars should move much more slowly than Earth.
- "Mars" and "Earth" can also rotate as they orbit.

Have other kids choose a planet, pick up the object representing it and walk its orbit around your model Sun. When kids start the orbits of other planets, have them adjust their pace for the planet's orbital period.

Step 5: Talk about exploring the our solar system

Now that they understand what's out in the solar system, get kids thinking about exploring it! Discuss what kids know about space exploration, find out what they want to learn, and get ready to launch into more books and activities.

Save your Solar System Statistics cards and models for future reference and activities.

Activity 2: Sizes in the Solar System

More model solar system activities

Solar System in My Neighborhood (Lunar and Planetary Institute)
https://www.lpi.usra.edu/education/explore/solar_system/activities/familyOfPlanets/solarSystem/

Where Are We in the Solar System? (NASA)
https://www.jpl.nasa.gov/edu/teach/activity/jewel-of-the-solar-system-part-2-where-are-we-in-the-solar-system

Scale Model of the Sun and Earth (NASA)
https://sunearthday.nasa.gov/2007/materials/solar_pizza.pdf

If the Moon Were Only One Pixel: A tediously accurate map of the solar system
https://joshworth.com/dev/pixelspace/pixelspace_solarsystem.html

Sizing Up the Solar System

2

Space Object	Why You Chose It
Sun	
Mercury	
Venus	
Earth	
Earth's moon	
Vesta asteroid	
Mars	
Jupiter	
Saturn	
Uranus	
Neptune	
Pluto	

Activity 3: Comet on a Stick

Introduction

Comets are large balls of ice, frozen gas, and dust, sort of like outer space snowballs! They travel in long, **elliptical orbits** around the Sun — it can take hundreds of years to complete one orbit. When a comet gets close to the Sun, the ice turns to gas and together with the dust it streams out to create two long tails. If the comet passes closes to Earth, we can see the tails as bright streaks in the night sky. Comet dust tails can be 6 million miles long and can sometimes stretch almost 100 million miles!

Supplies

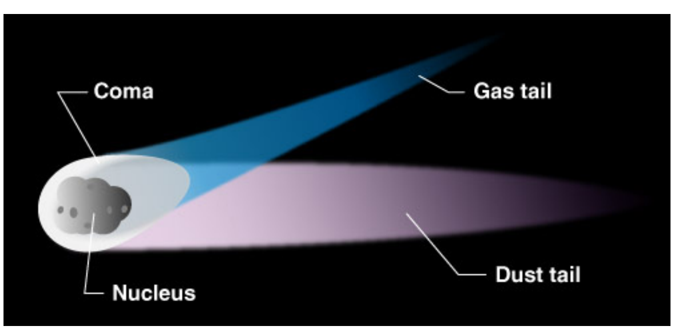
- Chopsticks, popsicle sticks, wooden skewers, or glow sticks (one per child)
- Aluminum foil (12-inch wide)
- Metallic ribbon, mylar strips, or regular ribbon — 3-6 ft per child
- Ruler
- Scissors
- Hairdryer (optional)

Get kids thinking

Watch: Comets and Astriods (SciShow Kids): https://www.youtube.com/watch?v=02wrLS-ue1Q

Comets have four parts: (1) the solid nucleus made of rock, dust, gas, and ice; (2) the coma, a fuzzy cover of ice and dust; (3) a gas tail; and (4) a dust tail.

Ask kids: Have you ever seen a comet in the night sky? What did it look like?



Activity 3: Comet on a Stick

Let's get started!

In this challenge, kids will make a simple model of a comet and then observe what happens when their comet gets close to the Sun.

Making the comets

- Preparation: Cut five pieces of ribbon: two long pieces, two medium pieces, and one short piece for each child. If you want an extra long tail, make the long pieces about three feet in length. For each child, cut three pieces of aluminum foil so they're roughly 6" x 6".
- Show kids how to tie the ribbons around the end of the chopstick, popsicle stick, skewer, or glow stick. To make the ribbon to be as long as possible, tie the knot close to the edge of the ribbon. The ribbons are your comet tails.
- Tell kids to hold the ribbon pieces off to one side and gather the tin foil around the end of the stick with the knot of ribbons. The aluminum foil creates the nucleus and coma.
- Have kids repeat with two more sheets of foil. Gather it around and form it into a ball. If you want a bigger comet, add more aluminum foil!

Now your comet is ready to fly! Tell kids to hold the stick of their comets and run around the room with enough speed so that the ribbon "tails" are flying behind them.

Demonstrating the solar wind

The solar wind is a stream of electrically charged particles that are constantly shooting out of the Sun. Astronauts and spaceships need to steer clear!

The solar wind causes the coma to flow back behind the nucleus, forming the two tails of the comet. Because it is blown by the solar wind, the comet's tail always points directly away from the Sun.

Use a hairdryer to demonstrate the solar wind — the Sun's energy as it meets the comet. Have one child be the Sun and stand in place with the hairdryer turned onto high speed. Have the kids approach the hairdryer, one at a time. **Ask kids:** what happens to your comet as you get closer to the Sun?

Writing About the Solar System

Writing helps kids process and solidify new knowledge and gives them an opportunity to use new vocabulary and concepts. Offer one or more of these prompts or questions to get your Space Rangers writing. Look at your list of solar system words for inspiration.

Inspired by music

In the early 20th century, composer Gustav Holst wrote a seven-part suite for an orchestra called *The Planets*. Each part was inspired by and named after one of the seven planets in our solar system and their astrological character:

- Mars, the Bringer of War
- Venus, the Bringer of Peace
- Mercury, the Winged Messenger
- Jupiter, the Bringer of Jollity
- Saturn, the Bringer of Old Age
- Uranus, the Magician
- Neptune, The Mystic

Listen!

Holst's *The Planets*: https://www.youtube.com/watch?v=Isic2Z2e2xs&t=2399s

'The Planets' at 100: A Listener's Guide to Holst's Solar System (NPR): https://www.npr.org/sections/deceptivecadence/2018/09/28/652700640/the-planets-at-100-a-listener-s-guide-to-holst-s-solar-system

Gustav Holst's 'The Planets': a guide (Classic FM): https://www.classicfm.com/composers/holst/pictures/holsts-planets-guide/

Get kids thinking

Talk about a planet and what we know about it. Ask the kids to listen to a portion of the piece about that planet and imagine that they ARE the planet. Does the music suit them? How do they feel when they hear the music? What is the planet thinking or what is happening on or to the planet as the music is playing?

Writing About the Solar System

Writing prompts

Write about a planet — from the planet's point of view! Give a first-person account of a planet, providing details about your place in the solar system. What do you want everyone to know about you?

Imagine that you are a reporter assigned to get the inside story about how Pluto feels about its status change to dwarf planet.

Play with words

Write a list poem about the solar system. Create a thoughtful list that focuses on the relationship between the Sun and all the other objects in the solar system. Create additional Planetary Poetry using other poetic forms:
https://www.jpl.nasa.gov/edu/teach/activity/planetary-poetry/

Travel the solar system

You've just opened a new travel business to take passengers on tours of the solar system. Create a detailed itinerary (what's going to happen on the trip) that gives passengers information about the planets they will be visiting, how long it will take them to get there, and what they should pack!

Planet puppet show

Share your knowledge of the solar system with others! Write an original script or adapt one of the books you read about the solar system and use the planet models you created to put on an out-of-this world performance filled with fun facts about the planets and their place in our solar system.

Kid-friendly Websites and Apps

Websites

A Tour of the Solar System (Sea and Sky)
http://www.seasky.org/solar-system/solar-system.html

Planet Compare
https://callumprentice.github.io/apps/planet_compare/

Video: Solar System Playlist (National Geographic Kids)
https://kids.nationalgeographic.com/explore/youtube-playlist-pages/youtube-playlist-solar-system/

Space Place (NASA)
https://spaceplace.nasa.gov/

Interactive: The Story of the Solar System (American Museum of Natural History)
https://www.amnh.org/explore/videos/space/impact%21-tracking-near-earth-asteroids/interactive-the-story-of-the-solar-system

Tour the Solar System (PBS Learning Media)
https://www.pbslearningmedia.org/resource/buac18-68-sci-ess-toursolarsystem/tour-the-solar-system/

Solar System (BrainPOP)
https://www.brainpop.com/science/space/solarsystem/

Educational apps

NASA (Apple)
https://www.commonsensemedia.org/app-reviews/nasa

Solar System Explorer (Android)
https://www.commonsense.org/education/app/solar-system-explorer

Britannica Kids: Solar System (Apple) $
https://www.commonsensemedia.org/app-reviews/britannica-kids-solar-system

Solar System (Apple) $
https://www.commonsensemedia.org/app-reviews/solar-system-for-ipad

Sun

The sun is a massive ball of gas and the largest body in the solar system.

Diameter	863,400 miles (1,390,000 km)
Surface Temperature	10,800° F (6,000° C)
Interior Temperature	27,000,000° F (15,000,000° C)
Rotational Period	25–36 days
Estimated Age	4.5 billion years
Primary Chemical Component	Hydrogen

Mercury

Mercury is the closest planet to the sun and the smallest in the solar system.

Diameter	3,031 miles (4,880 km)
Natural Satellites	0
Distance from the Sun	35,974,272 miles (57,910,000 km)
Rotational Period	58.65 days
Orbital Period	87.97 days
Surface Temperature	354° F (179° C)
Main Atmospheric Component	Helium

Venus

The second planet from the sun, cloud-covered Venus rotates from east to west.

Diameter	7,518 miles (12,103 km)
Natural Satellites	0
Distance from the Sun	67,214,920 miles (108,200,000 km)
Rotational Period	243.0 days
Orbital Period	224.7 days
Surface Temperature	899° F (482° C)
Main Atmospheric Component	Carbon Dioxide

Earth

The only planet with liquid water on its surface, it is the only planet to support life.

Diameter	7,924 miles (12,756 km)
Natural Satellites	1
Distance from the Sun	92,933,000 miles (149,600,000 km)
Rotational Period	23 hours, 56 mins
Orbital Period	365.2 days
Surface Temperature	354° F (179° C)
Main Atmospheric Component	Nitrogen

Mars

The fourth planet from the sun is a barren, rocky, rusty red world.

Diameter	4,220 miles (6,794 km)
Natural Satellites	2
Distance from the Sun	141,050,000 miles (227,940,000 km)
Rotational Period	24.62 hours
Orbital Period	687 days
Surface Temperature	-81° F (-63° C)
Main Atmospheric Component	Carbon Dioxide

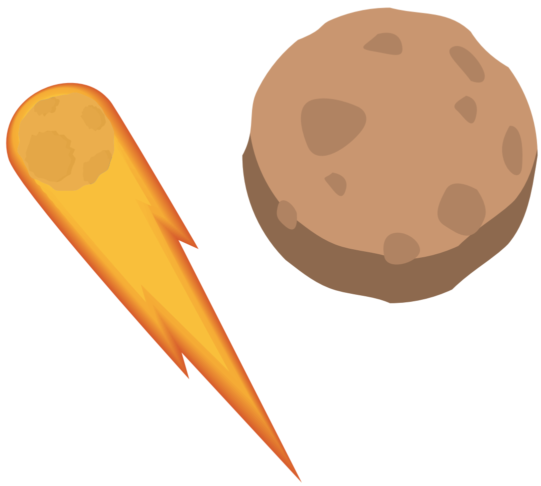
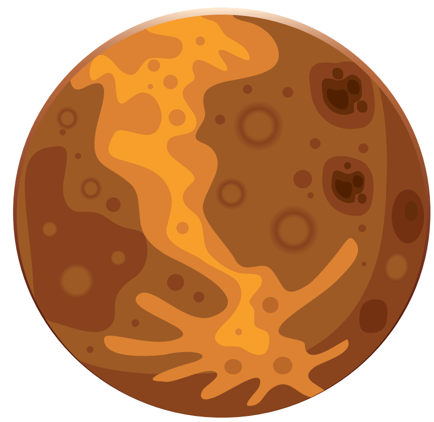
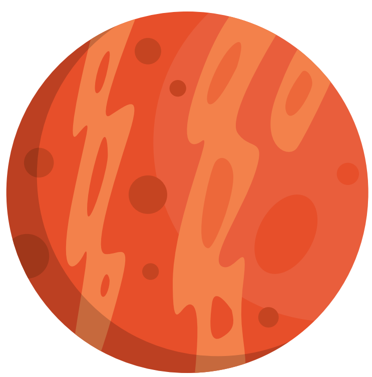
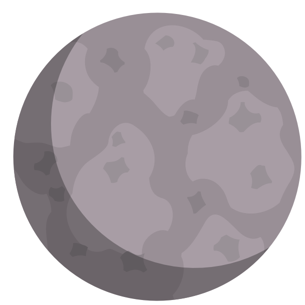
Asteroids and Comets

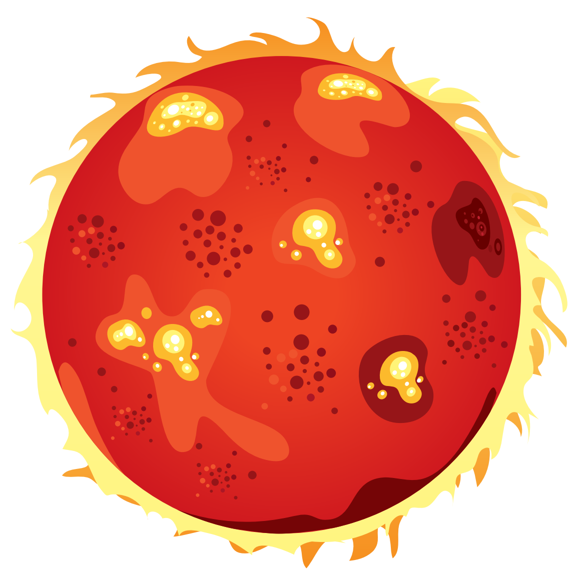
Asteroids are big space rocks left over from when the solar system formed about 4.6 billion years ago. Most asteroids orbit the sun within the main asteroid belt between Mars and Jupiter.

Number of known asteroids: 794,770

Comets are the oldest, most primitive bodies in the Solar System. They are huge snowballs of frozen gases, rock, and dust that orbit the sun. When close to the sun, a comet heats up, and its dust and gases form a tail that stretches for millions of miles.

Number of known comets: 3,570



Jupiter

Almost twice the size of all of the other planets combined and has a giant red spot.

Diameter	88,823 miles (142,984 km)
Natural Satellites	64 known
Distance from the Sun	482,546,000 miles (778,330,000 km)
Rotational Period	9.84 hours
Orbital Period	4333 days
Cloud Temperature	-185° F (-121° C)
Main Atmospheric Component	Hydrogen

Saturn

Saturn, a gas giant with three main bands of rings, is called the jewel of the solar system.

Diameter	74,565 miles (120,536 km)
Natural Satellites	62
Distance from the Sun	884,740,000 miles (1,429,400,000 km)
Rotational Period	10.25 days
Orbital Period	29.46 years
Cloud Temperature	-193° F (-125° C)
Main Atmospheric Component	Hydrogen

Uranus

The only planet that rotates on its side, Uranus is a featureless blue-green sphere.

Diameter	31,755 miles (51,118 km)
Natural Satellites	27
Distance from the Sun	1,783,487,000miles (2,870,990,000 km)
Rotational Period	17.3 hours
Orbital Period	84 years
Cloud Temperature	-315° F (-193° C)
Main Atmospheric Component	Hydrogen

Neptune

A giant blue sphere with unusual cloud features and a thin, dark system of rings.

Diameter	30,744 miles (49,492 km)
Natural Satellites	13
Distance from the Sun	2,798,116,000miles (4,504,300,000 km)
Rotational Period	15.8 hours
Orbital Period	165 years
Cloud Temperature	-315° F (-193° C)
Main Atmospheric Component	Hydrogen

Pluto

Pluto is officially classified as a dwarf planet and has an oval and tilted orbit.

Diameter	1,473 miles (2,370 km)
Natural Satellites	5
Distance from the Sun	3,673,537,000miles (5,913,520,000 km)
Rotational Period	6.3 days
Orbital Period	248 years
Surface Temperature	-382° F (-230° C)
Main Atmospheric Component	Methane

Moon

Our moon is the 5th largest of the 190+ moons orbiting planets in the solar system.

Diameter	2,160 miles (3,476 km)
Natural Satellites	0
Distance from the Earth	238,800 miles (384,400 km)
Rotational Period	27.32 days
Orbital Period	27.32 days
Surface Temperature	0° F (-17° C)
Main Atmospheric Component	Hydrogen