

Start with a Book: Space Rangers

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.





Get kids thinking

WATCH: Watch This Guy Build a Massive Solar System in the Desert
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 7).

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?





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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	Approximate 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





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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.





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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.





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More model solar system activities

SOLAR SYSTEM IN MY NEIGHBORHOOD (LUNAR AND PLANETARY INSTITUTE)

lpi.usra.edu/education/explore/solar_system/activities/familyOfPlanets/solarSystem/

WHERE ARE WE IN THE SOLAR SYSTEM? (NASA)

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)

sunearthday.nasa.gov/2007/materials/solar_pizza.pdf

IF THE MOON WERE ONLY ONE PIXEL:

A TEDIOUSLY ACCURATE MAP OF THE SOLAR SYSTEM

joshworth.com/dev/pixelspace/pixelspace_solarsystem.html





Sizing Up the Solar System

Space Object	Why You Chose It
SUN	
MERCURY	
VENUS	
EARTH	
EARTH'S MOON	
VESTA ASTEROID	
MARS	
JUPITER	
SATURN	
URANUS	
NEPTUNE	
PLUTO	

