



Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Student Exploration: Solar System

**Vocabulary:** atmosphere, ellipse, gas giant, gravity, inner planet, orbit, outer planet, planet, rocky planet, solar system, year

**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)

1. Name all the **planets** you can think of. \_\_\_\_\_  
\_\_\_\_\_
2. What object is at the center of the **solar system**? \_\_\_\_\_
3. What force keeps the planets from flying out of the solar system? \_\_\_\_\_

### Gizmo Warm-up

On the *Solar System* Gizmo, check that the ORBIT tab is selected. At first you can only see the four **inner planets**. The distances of the planets to the Sun are to scale, but sizes are not.

1. Move the cursor over each planet to learn its name. What are the four inner planets?

\_\_\_\_\_

These planets are called **rocky planets** because their surfaces are rocky.

2. Click the “-” button (upper right) three times to zoom out. What are the names of the four **outer planets**?

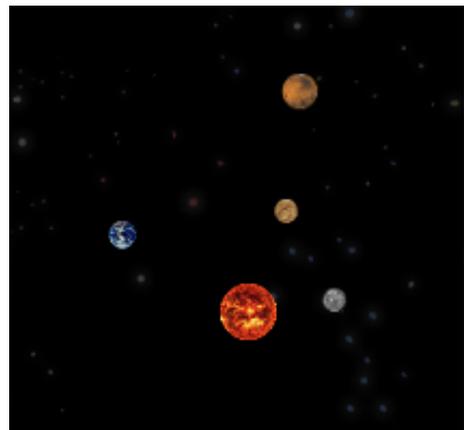
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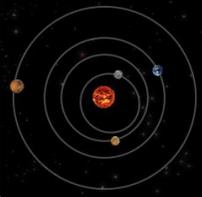
These planets are called **gas giants** because they are essentially huge balls of gas.

3. Before 2006, while Pluto was still considered a planet, people used this saying to remember the nine planet names: “My very excellent mother just sent us nine pizzas.”

Come up with a new sentence to help remember the eight planet names, in order.

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<p><b>Activity A:</b> <b>Planetary orbits</b></p>	<p><u>Get the Gizmo ready:</u></p> <ul style="list-style-type: none"> <li>• Check that the ORBIT tab is still selected.</li> <li>• Click the “o” button to reset the zoom level.</li> <li>• Be sure that the <b>Speed</b> is set to <b>Slow</b>.</li> <li>• Turn on <b>Show orbits</b>.</li> </ul>	
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**Question: How long is a year on each planet?**

1. Observe: The path a planet takes around the Sun is its **orbit**. Planets move in orbits because of the Sun’s **gravity**, a force pulling inward toward the Sun. Click **Play** (▶).

A. What is the shape of orbits? \_\_\_\_\_

The actual shape of an orbit is an **ellipse**, or flattened circle. Planetary orbits are only slightly flattened so that they look almost perfectly circular to the naked eye.

B. Which planet’s orbit looks the least like a circle? \_\_\_\_\_

2. Measure: Click **Reset** (↺). Now you will measure how long it takes each planet to orbit the Sun. Notice that the date shown below the simulation is today’s date.

- Drag an **arrow** from the left of the Gizmo and place it next to Mercury.
- Click **Play**. When Mercury completes one orbit (reaches the arrow), click **Pause**.
- Record **Today’s date** and the **One orbit date** in the first row of the table below.
- Do the same steps for each planet, filling in the table as you go.
  - For the outer planets, zoom out (–) and increase the **Speed** of the simulation.

Planet	Today’s date	One orbit date	Year length
Mercury			months
Venus			months
Earth			years
Mars			years
Jupiter			years
Saturn			years
Uranus			years
Neptune			years

3. Calculate: A **year** is the time it takes a planet to complete one orbit. Use your data to estimate the **Year length** for each planet. Use time units of Earth years or Earth months. Why does it take the outer planets so long to orbit the Sun? Try to come up with 2 reasons.

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\_\_\_\_\_



<p><b>Activity B:</b> <b>Comparing planets</b></p>	<p><u>Get the Gizmo ready:</u></p> <ul style="list-style-type: none"> <li>• Select the SIZE tab.</li> </ul>	
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**Question: What are the interesting features of each planet?**

1. Observe: Look closely at the diagram of planets. Based on the diagram, list the planets from smallest to largest:

\_\_\_\_\_ (smallest) \_\_\_\_\_  
 \_\_\_\_\_ (largest)

2. Compare: How do the four rocky planets compare to the four gas giants in size?

\_\_\_\_\_

3. Analyze: Most planets are surrounded by layers of gas called an **atmosphere**. Click on each planet and read about it. Focus on information about each planet’s atmosphere.

A. Of the rocky planets, which have well-developed atmospheres?

\_\_\_\_\_

B. Which has only a thin atmosphere? \_\_\_\_\_

C. Which has no atmosphere at all? \_\_\_\_\_

D. Which planets are mostly “made of” atmosphere? \_\_\_\_\_

\_\_\_\_\_

4. Analyze: How is the size of a planet related to the thickness of its atmosphere? Explain.

\_\_\_\_\_  
 \_\_\_\_\_

5. Extend your thinking: Which planet do you think would be easiest for humans to colonize some day? Explain. \_\_\_\_\_

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