

Earth Orbits the Sun

NOTE: Children should always be given ample time to experiment, notice, and wonder before they are provided an explanation.

Always engage children with our two favorite questions:

What do you notice?

What do you wonder?



Resist the urge to answer any questions children have while exploring. Instead, respond back with questions to children and let them make sense of the world. Sample questions you might use: What do you think? Do you notice any patterns? What could we change? Can we test something else? What can we try next? If children ask a testable question, which they could answer by doing an experiment, talk through with them how they might design a test to help answer their question. As much as possible and within reason, let them test their questions by trying the experiments they propose.

Learning Objectives

Children will...

- observe how Earth orbits the Sun.
- learn the Sun is at the center of the Earth's orbit.
- understand one revolution of the Earth around the Sun is a year.

Key Question

How does Earth move around the Sun?

Vocabulary (See **What the heck? Explanation of Science** at the end for definitions.)

Sun	Orbit	Year
Earth	Revolution	Model

Materials

9" Metal Pie Tin	Bouncy Ball
Dry Erase Marker	Orange or Yellow Play-Doh

Notice and Wonder Developmentally Appropriate Practice

1. Have one of the children roll the Play-Doh into a ball.
2. Stick the ball in the middle of the pie tin (flatten the bottom so it will stay in place) to represent the Sun.
3. Add the bouncy ball to represent the Earth. Show how to hold pie tin to make Earth orbit around the Sun.
4. Let each child have a turn making the Earth orbit the Sun. Challenge them to keep the Earth moving at the same speed as they tilt the pan to move the bouncy ball.
5. With a dry erase marker, mark a spot on the edge of the pan. Explain that it takes Earth a year to make one complete revolution around the Sun.
 - **NOTE:** Do not use the term rotate or rotation here. It has a different meaning from revolution. See the What the Heck? Explanation at the end for definitions.
6. Demonstrate how to count years by starting the bouncy ball Earth at the mark and making it orbit the Sun until it comes back to the same spot (one revolution) and count 1 year aloud.
7. Let each child show how many times the Earth has revolved around the Sun based on their age. Example – a four-year-old child would start the ball at the mark and move it around the orbit four complete revolutions while they count aloud “one year, two years, three years, four years old!”

Children should notice...

- the Earth orbits (revolves) around the Sun.
- the Sun is at the center of the Earth’s orbit.
- one year has passed when the Earth has made one complete revolution around the Sun.

Extensions for Additional Learning

As always, ask the children throughout the experiment what they notice and what they wonder. If their wonder questions are testable, as much as possible and within reason, let them test their questions by trying new experiments.

See below for examples of what they might wonder and experiments they might do to test their wonderings. NOTE: Some of their questions may be answered in the What the Heck? Explanation at the end.

- I wonder how other planets orbit the Sun?
- I wonder how long it takes for other planets to orbit the Sun?
- I wonder what we would have to do to include other planets in our model?
 - Let them try it!
 - Children could use a pizza pan to model Mars orbiting the Sun.
 - Children could use a small round pan to model Venus orbiting the Sun.

Differentiating Developmentally Appropriate Practice

For younger children, you may have to guide the tilting of the pan while they hold it until they have mastered the motion required to get the Earth orbit the Sun.

For older children, using the pizza pan to model Mar's orbit will be more challenging because the outside edge is not as tall. The planet will have a tendency to fall of the pan easier so it will take better coordination and control to get it to orbit correctly.

Older children could potentially model more than one planet at a time by nesting a smaller round pan inside the 9" pie pan and then placing the 9" pie pan on top of the pizza pan. In this way, you could have two three planets orbiting the Sun at the same time. This model would be inaccurate in that the planets orbit at different speeds. You could demonstrate this by getting three children to hold the pans separately. Venus should go around the pan faster than Earth and Mars should go around its pan slower than Earth.

#STEMAZingPictureBook Recommendations:

Sun! One in a Billion by Stacy McAnulty

Earth! My First 4.54 Billion Years by Stacy McAnulty

Connections to the activity:

Use an inflatable globe and a flashlight, to show how light shines one side of the Earth while the other side of Earth is dark.



References

Adapted from: <https://www.giftofcuriosity.com/how-planets-orbit-the-sun-a-montessori-inspired-activity/>

SAFETY CONCERNS

As always, a choking hazard with small objects like the bouncy ball or marbles you might use to represent the planets is a hazard.

AZ Early Learning Standards

Science Standard - Strand 1: Inquiry & Application - Concept 1: Exploration, Observation & Hypotheses

The child observes, explore, and interacts with materials, others, and the environment.

Science Standard - Strand 1: Inquiry & Application - Concept 2: Investigation

The child researches their own predictions and the ideas of others through active exploration and experimentation.



Earth Orbits the Sun

What the heck? Explanation of the Science (Vocabulary in bold.)

Earth is the planet we live on – the world. It is the third planet from the Sun. There are eight planets in our solar system. Mercury is closest to the Sun, followed by Venus, and then Earth. There are five planets with orbits further from the Sun. Those are (in order) Mars, Jupiter, Saturn, Uranus, and Neptune.

NOTE: Pluto was demoted from planet to dwarf planet in 2006 by the International Astronomical Union. A decision that is still controversial for some astronomers and lots of the general public who learned about nine planets when they were in school. A **planet** is now defined as a celestial body which (a) is in orbit around the Sun, (b) is nearly round in shape due to its mass, and (c) has cleared other objects from around its orbit.

Earth is the only known planet to have life on it though with thousands of exoplanets (planets orbiting other stars in our universe) now discovered, it is suspected that life does exist on planets in other solar systems. Earth's surface is 71% covered in water and evidence suggests Earth is 4.53 billion years old. The **Sun** is the star at the center of our solar system. It is the closest star to Earth. The Sun is a yellow dwarf star. It gives off energy in the form of light, which includes infrared, visible light, ultraviolet light, and radio waves.

Earth takes one **year** (or more precisely 365¼ days) to complete an **orbit** or **revolution** around the Sun. **NOTE:** The ¼ extra day is why we have a Leap Year that adds a day onto February every four years. Earth rotates (spins) on its axis once every 24 hours which causes day and night. The terms revolution, orbit, and revolve should only be used to describe Earth revolving around the Sun once ever year. The terms rotation, rotate, and spin should only be used to describe Earth rotating on its axis once every day.

How many days is a year (revolution period) for each planet? How long is a day (rotation period) for each planet?

Planet	Rotation Period (day)	Revolution Period (year)
Mercury	58.6 days	87.97 days
Venus	243 days	224.7 days
Earth	1 day	365.26 days
Mars	1.03 days	1.88 years
Jupiter	0.41 days	11.86 years
Saturn	0.45 days	29.46 years
Neptune	0.67 days	164.79 years