Adapted to STEMAZing ECE Format by
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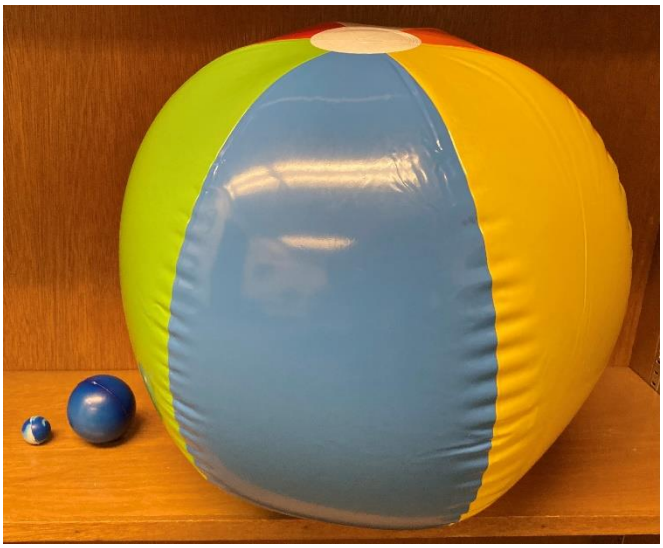
How big a celestial body are you?

Earth, Moon, & Sun Sizing



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 the size differences between the Earth, Moon, and Sun.
- discuss the location of the Earth, Moon, and Sun.

Key Question

Of the Earth, Moon, and Sun, which is the biggest?

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

Earth	Sun
Moon	Planet

Materials

Beach Ball	Bouncy Ball
Stress Ball	Vocabulary Cards

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Notice and Wonder Developmentally Appropriate Practice

1. Place all three balls on a table and ask children what they notice about them.
2. Explain that the balls represent the Earth, Moon, and Sun.
3. Ask which ball they think represents which.
    - Be sure to have them provide their reasoning as well – why do they think that?
4. Use a comparison or non-standard units to measure how tall the balls are. Were they right about which one is the biggest?
5. Show vocabulary cards and discuss definitions of each.
6. Discuss the sizes of the Earth, Sun, and Moon. (See What The Heck Science? section at the end for details.)

Children should notice…

- the balls are all different sizes as are the Earth, Sun, and Moon.
- the sun is the largest of the three, and the moon is the smallest.

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.

- I wonder why the sun is so big when it looks little in the sky?
- I wonder why the moon looks different all the time?
    - Let them try it!

#STEMAZingPictureBook Recommendations:

Sun! One in a Billion by Stacy McAnulty

Moon! Earth's Best Friend by Stacy McAnulty

Earth! My First 4.54 Billion Years by Stacy McAnulty

Connections to the activity:

Discuss Earth's rotation around the sun.

References:

Adapted from Marana USD STEMAZing Teacher Leaders' (Martha Bishop and Julie Bradshaw) Kinder Space Unit.

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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, Sun and Moon

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.

The **Moon** orbits Earth. It is called a natural satellite of Earth. It does not produce any of its own light but it does reflect sunlight to Earth as it moves around its orbit. The Moon is about ¼ the size of Earth. Earth's moon is the 5th largest moon in the solar system.

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.

All of this means, if Earth is represented by a 2.5" diameter stress ball, then the Moon would be 5/8" in diameter (a bit smaller than the bouncy ball). The Sun is an entirely different story. If Earth is 2.5" in diameter, then the Sun (which is about 109 times the size of Earth) would need to be 22.7 feet wide to have the same scale. The beach ball would need to be over 11 times bigger to keep the same scale.

The distances between the Earth, Sun, and Moon would be fairly large if scaled the same as Earth at 2.5". The Sun seems like it would be so big at learning 23 feet across, but it would be more than 5.5 miles away. At this scale, the Moon would be more than 6¼ feet away from each other. I don't think your arms would be long enough to hold it out that far!