

Our Neighborhood in the Universe

OVERVIEW —

This can be used as an introductory engagement or an initial formative assessment activity, as students use stickers of celestial objects to create a Venn diagram classifying objects in our solar system, galaxy, and universe.

Ages: 5th grade and up

Duration: 15 minutes

OBJECTIVE —

The students will:

- Classify planets, stars, and galaxies as a part of our solar system, our galaxy, or our universe.

MATERIALS —

For each student or pair of students (alternative materials listed below)

- The *Neighborhood in the Universe* diagram on 11x17 paper
- A half-sheet of standard mailing labels with printed photos of objects from the Stickers Template
- A pair of scissors

Material Alternatives

This activity can easily be modified for different styles of class interaction and to use different materials.

Alternatives to printing color photos onto mailing labels:

- Print the color images once, then laminate them for students to use and re-use at stations.
- Project the images and ask the students to draw their own versions with labels, either onto their diagrams or onto index cards that can then be sorted.
- Project the images and ask the students to write in the names of the objects on their diagrams.

Alternatives to 11x17 paper:

- Print the diagram on 8 ½ x 11 paper and have students draw or write the names of objects instead of using color images.
- Have students tape two sheets of 8 ½ x 11 paper together and draw the diagram.
- Use chalk and chalkboards for small groups or whole class discussions and classification.
- Use butcher paper for small groups to draw their own diagrams to populate.

ACTIVITY —

1. Invite the students to share what they know about the solar system, our galaxy (the Milky Way), and the universe.
 - *What is the definition of each?*
 - *Which is smallest? Which is largest?*
 - *What are some of the objects that can be found in the solar system? In the Milky Way? In the universe?*
2. Describe the activity to your students: they will be applying their own knowledge to sort objects in our solar system, galaxy, and universe in a Venn diagram.
3. Hand out a copy of the Venn diagram and a half sheet of the mailing labels to each student or pair of students (or alternative materials such as butcher paper and index cards). If using stickers, have students separate the objects by cutting the stickers in half (each label has photos of two objects.)

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4. If students do not have prior experiences using a Venn diagram, provide and discuss a relevant example as a class, such as classifying objects located in your school, in your city, and in your state.
5. Ask the students to use their own knowledge about each object to place it in the appropriate part of the Venn diagram.

IN CONCLUSION —

This activity can be conducted as an initial engagement or initial formative assessment. Follow-up class discussion should not be limited to the correct and incorrect answers, but also include what the students know and how they know it. If possible, invite the students to respond to others' statements rather than responding yourself.

- *Are there objects in our solar system that are not in our galaxy? What do you think of ____'s answer?* (Our solar system is a part of our galaxy, so everything in the solar system is a part of our galaxy.)
- *Are there objects in our galaxy that are not in our solar system? Can you share some examples? How do we know they are not in our solar system?* (Students often need to define our solar system to share their reasoning.)
- *Should we revise our earlier definitions for solar system, galaxy, and universe? What additions or changes should we make?*

Extensions:

Cosmic Survey (nasawavelength.org/resource/nw-000-000-001-532) will enable the students to share their understanding of the sizes and distances of assorted celestial objects. By physically manipulating images of objects in space, students represent their own mental models of space and time.

The Incredible Two-Inch Universe (nasawavelength.org/resource/nw-000-000-002-909) will enable the teacher to model the different scales in our universe. Learners explore the size and scale of the universe by shrinking cosmic scale in 4 steps, from the realm of the Earth and Moon to the realm of the galaxies.

Various solar system scale activities exist, such as *Scale Model of the Solar System* (nasawavelength.org/resource/nw-000-000-004-267) and *Earth, Earth's Moon and Mars Balloons* (nasawavelength.org/resource/nw-000-000-003-545).

Sorting the Solar System (astrosociety.org/edu/publications/tnl/70/pluto.html#10; alternate version at nightsky.jpl.nasa.gov/download-view.cfm?Doc_ID=459) enables students to explore different objects in the solar system and discuss what categories scientists assign to them.

Galaxy Sorting (www.astrosociety.org/wp-content/uploads/2013/07/H5_Galaxy_Sorting.pdf) enables students to sort galaxy images and decide on useful classification criteria.

FACILITATOR INFORMATION

About the activity

Students (and the public) often confuse the solar system with the galaxy, and with the universe. This leads to a variety of misconceptions and can make it difficult to build knowledge about astronomical phenomena. This activity is intended to take a step in creating a foundation needed to understand our place in the solar system, the galaxy, and the universe.

As an introductory engagement or formative assessment activity, this requires students to use prior knowledge, and helps them become aware of their own misconceptions and limitations. *Students should not be penalized for incorrect answers, unless the activity is repeated as a summative assessment at the end of the lesson.*

Background Information

Our solar system includes everything that orbits our Sun: the eight planets, all of their moons, dwarf planets, asteroids, comets, and meteoroids, as well as some dust and gas.

Our galaxy (the Milky Way) includes our solar system as well as hundreds of billions of other stars, and enormous clouds of gas and dust (nebulae). Many of the stars are in clusters. Every star we can see in the sky with our eyes is in our galaxy, along with billions of other stars we can see with telescopes and hundreds of billions we cannot see.

We can use telescopes to see other galaxies. Each galaxy has its own stars and nebulae. Our universe includes all everything we can or can't see: the solar system, everything in our galaxy, and all of the other galaxies and the space in-between.

Ties to the Next Generation Science Standards

Disciplinary Core Ideas: ESS1.A: The Universe and its Stars

- Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe.

Disciplinary Core Ideas: ESS1.B: Earth and the Solar System

- The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.

Science and Engineering Practices: Developing and Using Models

- Develop a diagram or simple physical prototype to convey a proposed object, tool, or process.

Science and Engineering Practices: Analyzing and Interpreting Data

- Represent data in tables and/or various graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.

Science and Engineering Practices: Engaging in Argument from Evidence

- Support an argument with evidence, data, or a model.

Websites For More Information and Resources

Solar System and Beyond: <https://www.nasa.gov/topics/solarsystem/index.html>

The latest news, images and features about NASA missions exploring our solar system and universe.

NASA Wavelength: <http://nasawavelength.org>

This is a digital collection of Earth and space science resources for educators of all levels – from elementary to college, to out-of-school programs. Search by keyword (such as galaxy) or browse by topic or audience.

Windows to the Universe: <http://www.windows2universe.org>

Windows to the Universe launches viewers into a variety of topics on all levels. The site is user-friendly and includes a Spanish version.

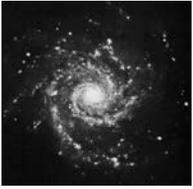
Solar System Exploration: Beyond our Solar System:

<http://solarsystem.nasa.gov/planets/beyond>

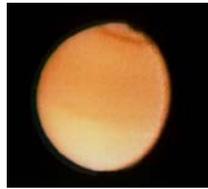
Details and graphics to put our solar system into perspective.

Stickers Template

Spiral Galaxy



Saturn's moon Titan



Andromeda Galaxy



Sun



Comet



Triangulum Galaxy



Jupiter



Stars (Pleiades)



Galaxy



Asteroid



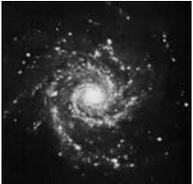
Orion Nebula



Polaris the North Star



Spiral Galaxy



Saturn's moon Titan



Andromeda Galaxy



Sun



Comet



Triangulum Galaxy



Jupiter



Stars (Pleiades)



Galaxy



Asteroid



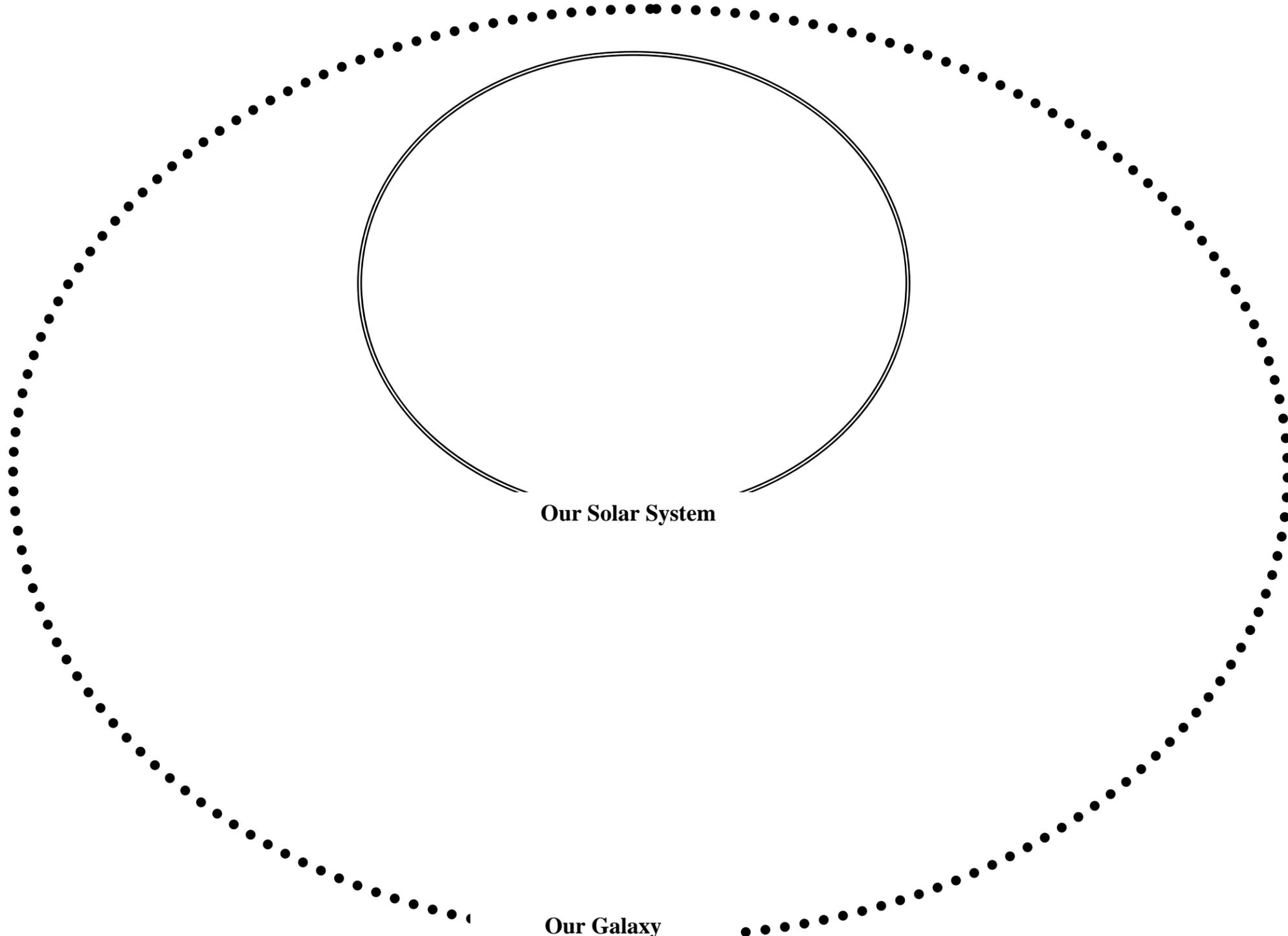
Orion Nebula



Polaris the North Star



Our Neighborhood in the Universe Place the photos in the right spot.



Our Solar System

Our Galaxy

The Universe