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Warm-Up | Star Systems and Galaxies

Lesson Question

How is the universe organized into systems and galaxies?

Lesson Goals

Explore how the universe is organized.

Describe star systems.

Distinguish the major types of galaxies.

Words to Know

Write the letter of the definition next to the matching word as you work through the lesson. You may use the glossary to help you.

E	eclipsing binary	A. a group of two or more stars
C	light-year	B. a large collection of stars, gas, and dust held together by gravity
A	star system	C. the distance that light travels in one year
B	galaxy	D. a star system with two stars
D	binary star	E. a star system in which one star occasionally blocks light from another

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Stars

Stars are huge spheres of gas. They are characterized by:

- color.
- temperature.
- size.
- composition.
- brightness.

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Star Systems

Most stars belong to groups of two or more stars called **star systems**.

- Binary **stars** have two stars.
  - One is often much brighter than the other.

Even if astronomers cannot see the dimmer star, they often can detect it due to the effects of its gravity.

- The dim star causes the bright star to wobble.
- The dim star may pass in front of the bright star; this is called an eclipsing **binary**.

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Star Clusters

Larger groupings of stars are called star clusters.

- All the stars in a given star cluster form from the same nebula.
  - They form around the same time.
  - They are about the same distance from Earth.

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Types of Star Clusters

The two major types of star clusters are open clusters and globular clusters.





Open clusters are loose and disorganized. They contain no more than a few thousand stars.

Globular clusters are tightly packed groups of older stars. They may contain more than a million stars.

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Galaxies

A **galaxy** is a large collection of stars, gas, and dust held together by gravity.

- Classified into three types based on shape
- Separated by huge distances called light-years, the distance that light travels in one year
  - One light-year is equal to 9.46 trillion kilometers (5.88 trillion miles).

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Spiral Galaxies

A spiral galaxy is shaped like a pinwheel. A spiral galaxy:

- has a [bulge] in the center.
  - Contains mostly old [red] stars
- has arms that curve in a spiral pattern.
  - Contain young blue and blue-white stars
  - Are the site of active star formation
- contains much [gas] and dust.

Spiral galaxies may be normal or barred.





[Normal] spiral galaxies have arms that start close to the center.

[Barred] spiral galaxies have a bar through the middle. The arms extend from that bar.

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The Milky Way Galaxy

The Milky Way galaxy contains billions of [stars] and our [solar] system.

- 100,000 light-years across

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Elliptical Galaxies

An elliptical galaxy may be football-shaped, egg-shaped, or round. An elliptical galaxy:

- has almost no [dust] and [gas] between stars.
- has no new stars being formed.

Irregular Galaxies

As the name suggests, irregular galaxies have irregular shapes. Irregular galaxies:

- are [smaller] than other types of galaxies.
- contain much dust and gas.
- contain many [young] stars.

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Summary | Star Systems and Galaxies

Lesson Question

How is the universe organized into systems and galaxies?

Answer

(Sample answer) Scientists organize the universe in the following way, from smallest to largest. Star systems are small groups of stars near each other. Several star systems make up a star cluster. A galaxy is a large collection of stars, gases, and dust. Galaxies can be classified as spiral, elliptical, or irregular. The universe is made up of all the galaxies.

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Review: Key Concepts

- Most stars belong to groups of two or more stars called star [systems].
- Large groupings of stars are called star [clusters].
  - Open clusters are loose, disorganized, and contain no more than a few thousand stars.
  - Globular clusters are tightly packed and may contain more than a million old stars.
- A galaxy is a large collection of stars, gas, and dust held together by [gravity]. Galaxy shapes include:
  - spiral.
  - elliptical.
  - irregular.

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Use this space to write any questions or thoughts about this lesson.

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