What Are the Differences Between the Planets and Stars?

SC.8.E.5.2, SC.8.E.5.3, LA.8.4.2.2

What Are the Major Types of Galaxies?

SC.8.E.5.2, SC.8.E.5.3

my planet Diary
for Florida

Posted by: Sarah
Location: Interlachen, Florida

Exactly how many stars are there in the universe? This question often puzzles me as I sit in the cool night air gazing at the blanket of stars overhead. Upon glancing through the telescope I can pick out the constellations Ursa Major, Leo, Orion, and a few others. Each time I turn to look at them I always feel closer than I actually am. Even though I must end my night-time star watching, I know they will always be there the next night.

Communicate Answer these questions. Discuss your answers with a partner.

1. Where you live, what can you see in the night sky?

2. Why does Sarah need a telescope to pick out some constellations?

Go to Planet Diary to learn more about galaxies.

What Are the Differences Between Planets and Stars?

Earth seems like a large place, but it is tiny compared to the sun, which is tiny compared to the whole solar system. The solar system is a speck in a much larger galaxy. Our galaxy is small compared to the universe. The universe is all of space and everything in it. It is so large it takes light billions of years to cross only a part of it.
Stars and Planets Compared  A star is a giant ball of gas, primarily hydrogen and helium, which undergoes nuclear fusion. Our sun is an example of a star. A planet is an object that orbits a star, is large enough to have become rounded by its own gravity, and has cleared the area of its orbit. Earth is an example of a planet.

Made mostly of gas as opposed to solids and liquids, most stars are much larger and hotter than planets. The sun’s diameter is 100 times that of Earth. If the sun were hollow, a million Earths would fit inside. But the sun is small compared to the vastness of outer space. The distance from Earth to the sun is about 100 times the diameter of the sun!

A solar system contains a star and the planets and other objects that revolve around the star. Solar systems are also called planetary systems. Our solar system contains the sun, Earth, and planets and objects that revolve around the sun. The farthest planet from the sun, Neptune, is 30 times as far away from the sun as Earth.

Not all planets are made up of the same material. Some planets in our solar system are made mostly of rocky and metallic materials, but others are mostly liquid and gas. Furthermore, the outer planets are huge compared to the inner planets. Jupiter’s radius is over 11 times as long as Earth’s.

Earth and Jupiter Compared  A thousand Earths would fit inside the planet Jupiter.

Calculate How many Jupiters would fit inside the sun?

| LA.8.4.2.2 |
Star Systems and Galaxies  Our solar system has only one star. But this is not a common situation for stars. Most stars are members of groups of two or more stars, called star systems. If you were on a planet in one of these star systems, you might see two or more suns in the sky!

Star systems that have two stars are called double stars or binary stars. (The prefix bi- means “two.”) Often one star in a binary star system is much brighter and more massive than the other. Astronomers can detect the dim companion by observing the effects of its gravity. The dim star’s gravity causes the bright star to wobble. Astronomers use this same method to detect planets around other stars.

Many stars belong to larger groupings of stars called star clusters. All of the stars in a particular cluster formed at around the same time and are about the same distance from Earth.

A galaxy is a huge group of single stars, star systems, star clusters, dust, and gas bound together by gravity. Galaxies are much larger than solar systems or star systems. Our galaxy is about 100,000 times as big as our solar system. If you could hold the solar system in your hand, then the galaxy would be about the size of the whole Earth. The distances between galaxies are usually much larger than the galaxies themselves.

Predict  Would it be faster for you to travel from planet to planet within a solar system, from star to star within a galaxy, or from galaxy to galaxy within the universe? Explain.
Assess Your Understanding

1a. Define  What is a star?

b. Distinguish  What are the main differences between a planet and a star?

c. ANSWER THE QUESTION  What astronomical objects are in the universe?

got it?

- I get it! Now I know that compared to planets, stars are

- I need extra help with

Go to my science coach online for help with this subject.
What Are the Major Types of Galaxies?

There are billions of galaxies in the universe. The largest galaxies have more than a trillion stars. Astronomers classify most galaxies into the following types: spiral, elliptical, and irregular.

Spiral Galaxies

Some galaxies appear to have a bulge in the middle and arms that spiral outward, like pinwheels. These galaxies are spiral galaxies. The arms contain gas, dust, and many bright, young stars. Most new stars in spiral galaxies form in these arms. Barred-spiral galaxies have a bar-shaped area of stars and gas that passes through the center.

Elliptical Galaxies

Not all galaxies have spiral arms. Elliptical galaxies look like round or flattened balls. These galaxies contain billions of stars but have little gas and dust between the stars. Because there is little gas or dust, stars are no longer forming. Most elliptical galaxies contain only old stars.

Irregular Galaxies

Some galaxies do not have regular shapes. These are known as irregular galaxies. Irregular galaxies are typically smaller than other types of galaxies. They generally have many bright, young stars and lots of gas and dust to form new stars.

Quasars

Astronomers in the 1960s discovered distant, extremely bright objects that looked like stars. Since quasi means “as if” in Latin, these objects were called quasi-stellar objects, or quasars. Quasars are active young galaxies with huge black holes at their centers. Gas spins around the black hole, heats up, and glows.

Types of Galaxies

Classify Identify the four galaxies shown on these pages and explain.

A

B

C

D

102 Stars, Galaxies, and the Universe
Our solar system is located in a galaxy called the Milky Way. From the side, the Milky Way would look like a narrow disk with a large bulge in the middle. But from the top or bottom, the Milky Way would have a pinwheel shape. You can’t see the shape of the Milky Way from Earth because our solar system is inside one of the arms.

When you see the Milky Way at night during the summer, you are looking toward the center of our galaxy. The center of the galaxy is about 25,000 light-years away, but it is hidden from view by large clouds of dust and gas. But astronomers can study the center using X-rays, infrared radiation, and radio waves.

**Assess Your Understanding**

- **got it?**
  - I get it! Now I know that astronomers classify most galaxies into one of the following three types:
  
  - I need extra help with

Go to my science coach online for help with this subject.

**Draw Conclusions**

What kind of galaxy is the Milky Way? Explain why and draw a sketch of what the Milky Way might look like from outside.