

# THE ADVENTURES OF Spriggy & Twiggy

Spriggy and Twiggy are Sprowteez. They live with their Sprowtee friends on Sprowt Island. They are clever, funny and kind little scientists and always very curious...

After a fun afternoon playing at the beach, the Sprowteez plopped down on the warm sand to make sand angels.



## Glossary:

**Astronomer:** people who study the universe

**Galaxy:** massive collection of stars, planets, dust and gas held together by gravity

**Nebula:** is a cloud of gas and dust in space

**Speed of light:** the speed that light travels. Nothing can travel faster than the speed of light

**Telescope:** helps people see distant objects

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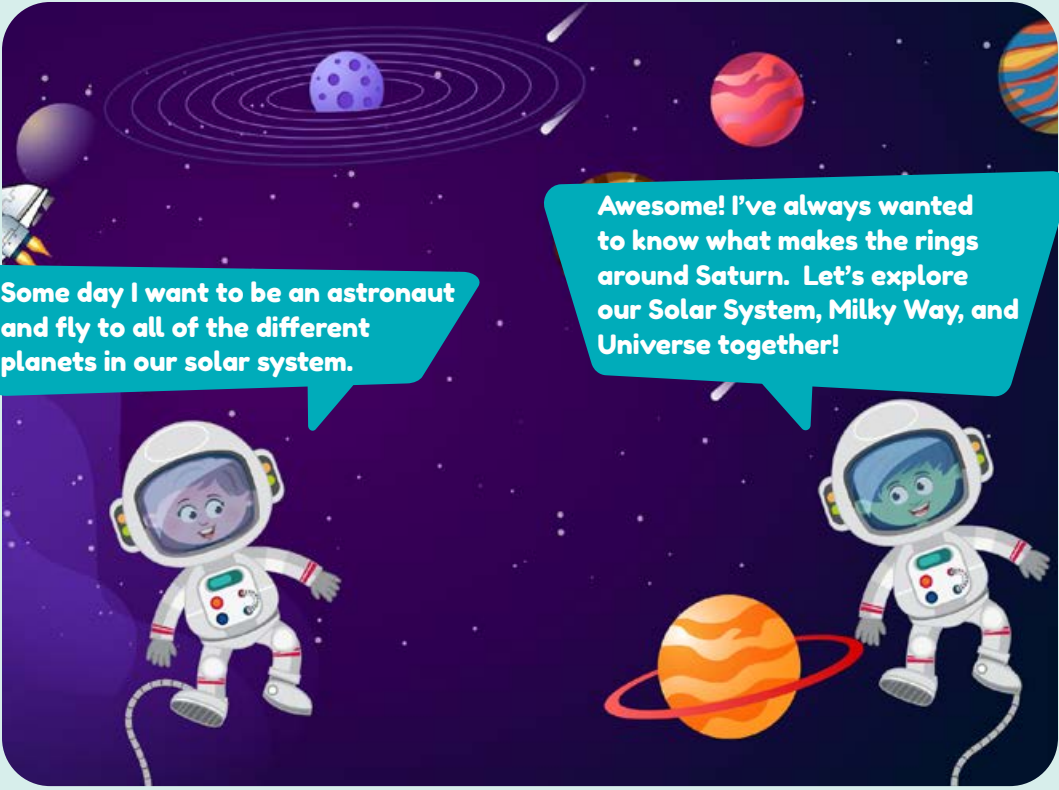




I love observing the night sky and imagining all the amazing places that might exist in our universe.

Me too! It's fun to imagine shapes of animals and people by drawing pretend lines between stars. Look at that group of stars over there - those are shaped like Crabby, too!

Seriously?! Stop imagining me in the sky! I don't see anything at all, just lots of little lights.



Some day I want to be an astronaut and fly to all of the different planets in our solar system.

Awesome! I've always wanted to know what makes the rings around Saturn. Let's explore our Solar System, Milky Way, and Universe together!



Crabby! Use your imagination!

With a telescope we can see amazing things like stars, planets, and part of our own Milky Way galaxy.

A Milky Way? You're making me hungry and thirsty.

The Sprowteez imagine themselves blasting off to discover more about Earth's place in the Universe!

# OUR UNIVERSE

Everything is in our Universe – our planet, our solar system, our galaxy, and all of space and time. The Universe is so big, that scientists estimate if you could travel as fast as the **speed of light**, it would take 93 billion years to get across.



## SPRIGGY ASKS, "HOW DID THE UNIVERSE BEGIN?"

Most scientists believe the Universe began in a big explosion about 14 billion years ago. At that time, the entire Universe was inside a tiny little bubble that is much, much smaller than a tip of a pen. It was hotter and denser than anything we can imagine.



All of a sudden – BANG! It exploded and the Universe we know was born. Time, space, and matter all began with the Big Bang.

Faster than you can blink your eye, the Universe grew to be larger than a galaxy. It has been growing ever since and is still getting bigger even today.



**WATCH IT!** The Big Bang! Watch the Origin of The Universe:

<http://tiny.cc/iSprowt-bigbang>



# OUR MILKY WAY GALAXY

The next time you are away from city lights, look up at the night sky and you will probably see a faint strip of light that looks a little bit like spilled milk.



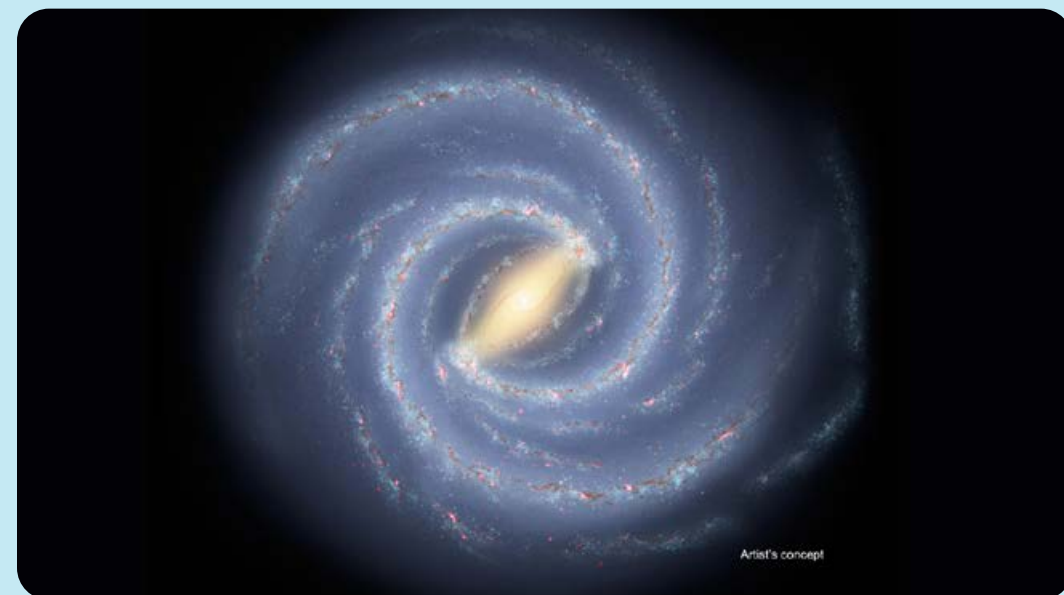
THE MILKY WAY IN THE NIGHT SKY, COLORADO

What you're seeing is a dense part of our **galaxy**. A galaxy is a massive collection of stars, planets, dust and gas held together by gravity.

Our Milky Way galaxy is shaped like a huge whirlpool and has at least 100 billion stars.

**DID YOU KNOW?** Our Sun is a star! Just like Earth orbits our star (the Sun), most stars have planets orbiting them. Our Milky Way has over 100 billion stars and most have their own planets orbiting them.

**DID YOU KNOW?** An astronomer is a scientist that studies the stars. Let's be astronomers together!

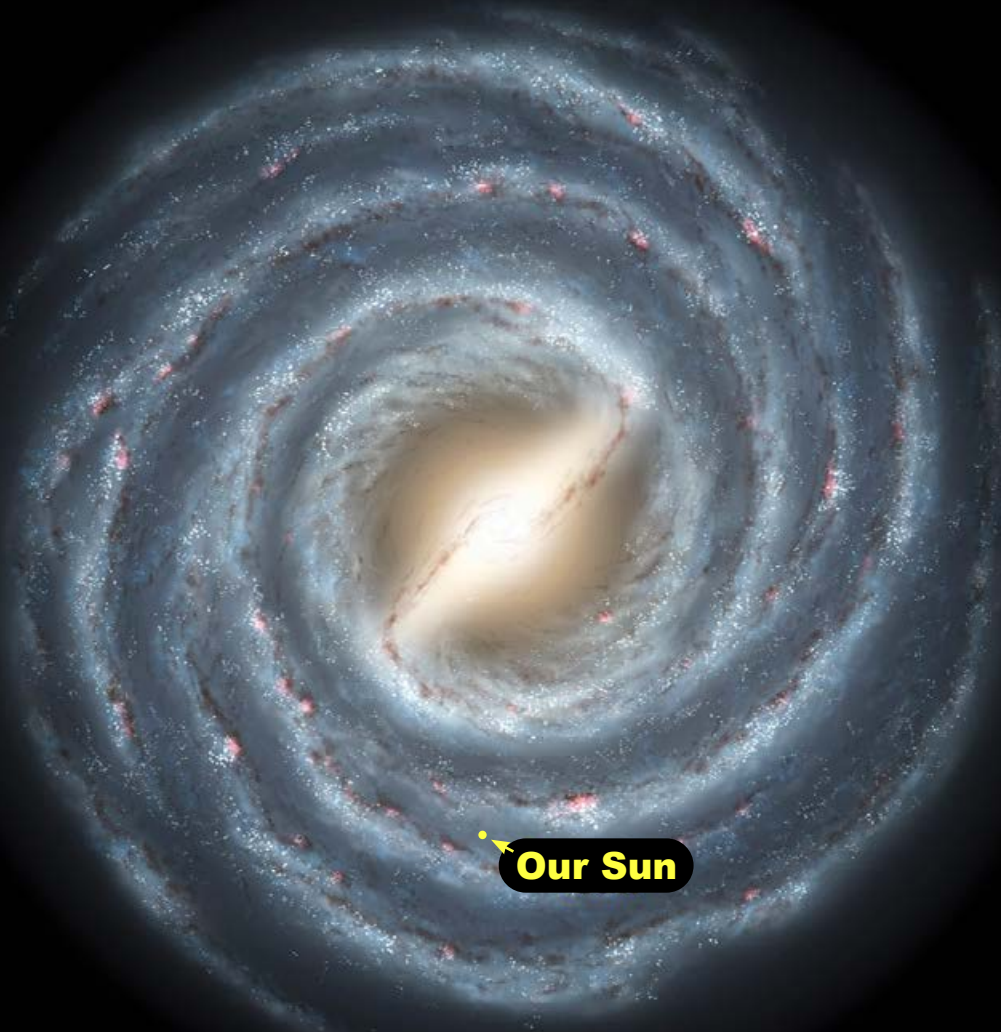


Artist's concept

# OUR MILKY WAY: A SPIRAL GALAXY

Each tiny dot is a star and is very far away. It would take a jet airplane a million years to get from our Sun to the next closest star.

The center of our Milky Way Galaxy is filled with so many stars it looks like one big star. All the stars we see at night are from our own Milky Way Galaxy.



Our Solar System is in the “suburbs” of the Milky Way. We are not in the center and we are not in a far away arm.

# EXPERIMENT: SPROWTEEZ STAR SIZE



## WHAT YOU NEED:

- ⊙ 2 Reflector Stars (supplied in kit)
  - ⇒ After the experiment, use these for your keys or hang them from your backpack.
- ⊙ Space to walk (a hallway, backyard, or park)



## LET'S DO IT!

1. Place one star as far away as possible but make sure you can still see it (across the room, across the playground) – hang it on something like a doorknob, tree branch, or have a friend hold it.
2. Hold the other star in your hand. Carefully walk backward examining both stars as you walk.



## PREDICT IT!

As you get further away, which star looks larger? Why do you think this is? Which star looks larger to your friend?



## TRY IT YOUR WAY:

1. Play with a friend or family member. How far away can you get and still see your star?
2. As you backed away, you probably noticed that the star in the distance looked much smaller.
3. How big and bright a star appears is partially due to the distance the star is from you, not its actual size. During the day, our Sun looks bigger than stars observed at night because it is much closer to the Earth, but our Sun is actually pretty small compared to other stars in the Milky Way Galaxy.

# GALAXIES

You now know that a galaxy is a massive collection of stars, planets, dust and gas. Astronomers believe that our Milky Way orbits around a big Black Hole in the middle. We are spinning at about 515,000 miles per hour. That's faster than if we could fly to the moon and back in one hour!

As gigantic as the Milky Way is, it's only a medium size galaxy. Scientists think there could be more than 200 billion galaxies in the universe!

## TYPES OF GALAXIES

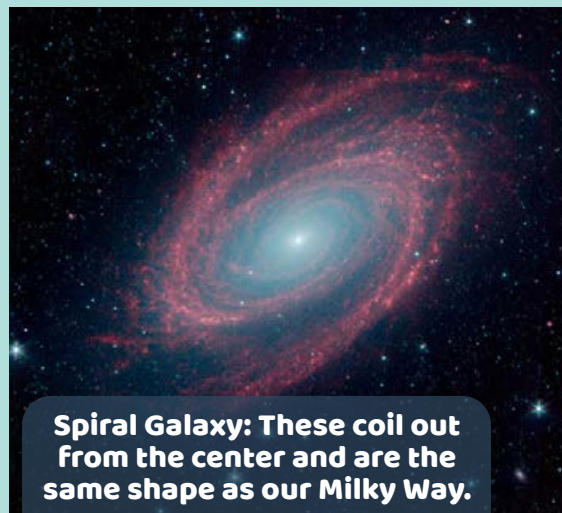
There are 3 main types of galaxies.



**Elliptical Galaxy:** These are round or oval.



**Irregular Galaxy:** These don't have any regular shape.

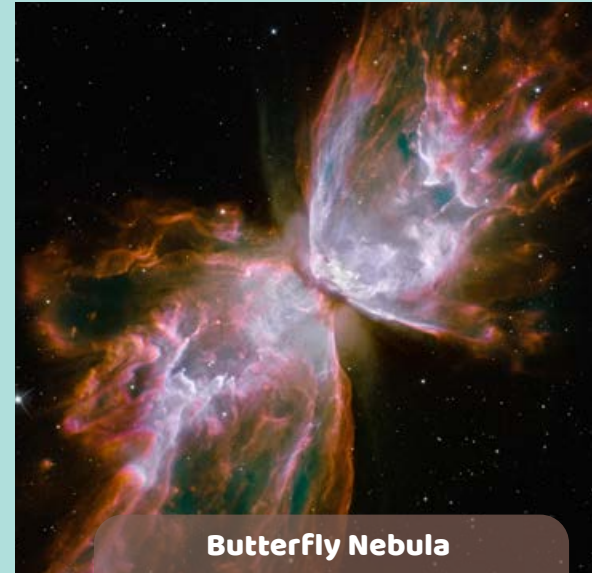


**Spiral Galaxy:** These coil out from the center and are the same shape as our Milky Way.

# WOW!

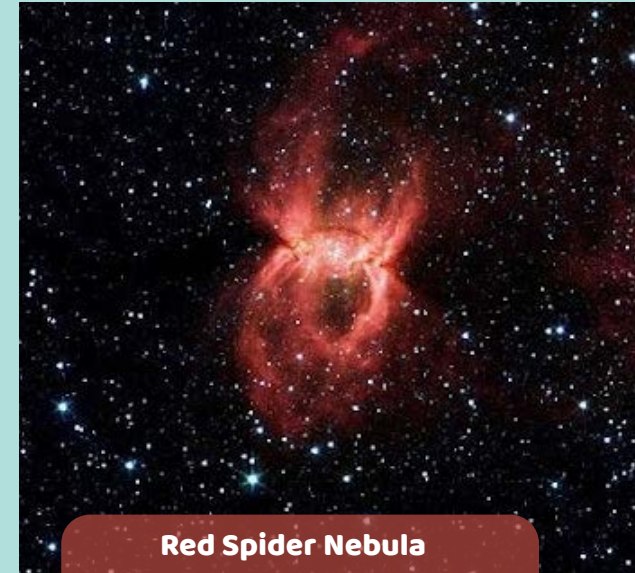
## WHAT A BEAUTIFUL NEBULA!

A **nebula** is a cloud of gas and dust in space. It can make amazingly beautiful shapes. Astronomers use very powerful telescopes to take pictures of faraway nebulae (more than 1 nebula).



**Butterfly Nebula**

The central star in this nebula is one of the hottest known stars. It is about 34 times as hot as the sun.



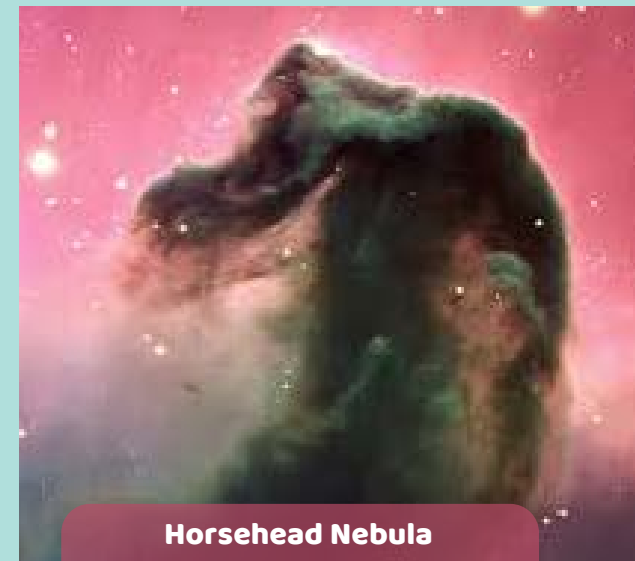
**Red Spider Nebula**

Located near the center of the Milky Way.



**Pillars of Creation**

These are within the Eagle Nebula. This is a place where new stars are being born.



**Horsehead Nebula**

The darkness in this cloud is caused mostly from dust.