STEM Workshop: Astronomy!

Lesson 6: Introduction to Astronomy

Brought to you by the University of Maryland Balloon Payload Program!

What is Astronomy?

Stars, galaxies, comets, black holes!

https://www.youtube.com/watch?v=dx3BQZ1VVCQ

What do you see in the night sky?

You have seen the Moon, but does it always look the same?

- Why?

Do you see stars?

- How many stars?

Are the stars twinkling?

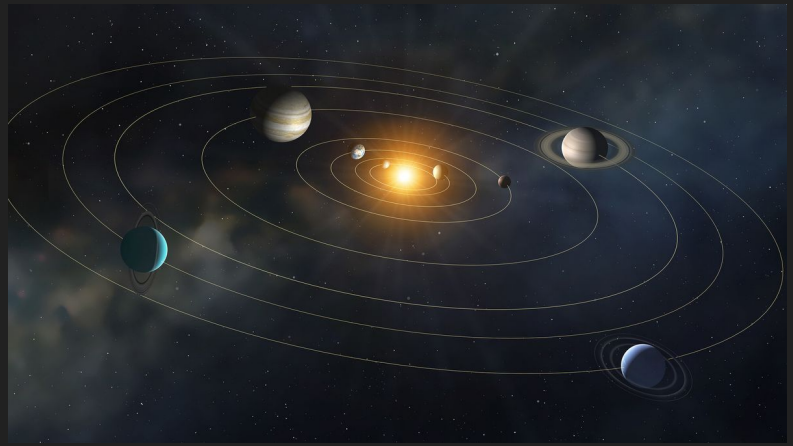
- If the star isn't twinkling…
  IT'S A PLANET!

What’s out there?

Astronomy is all about exploring the biggest thing in the universe: the universe!

Astronomers study things like

- Planets
  - Can you name any?
- Stars
  - Can you name any?
- Galaxies
  - Can you name any?!



Can you think of any other things astronomers might study?

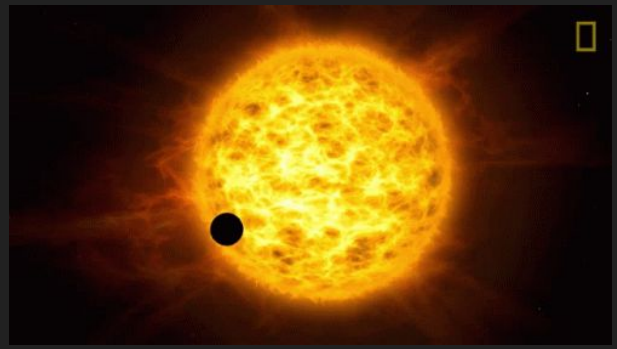
The Big Hot Sun

What are some things you know about the Sun?

Though the sun is about 93 million miles from us!

It’s about 100 times wider than Earth and 27 million degrees Fahrenheit!

But… how far away is that REALLY?

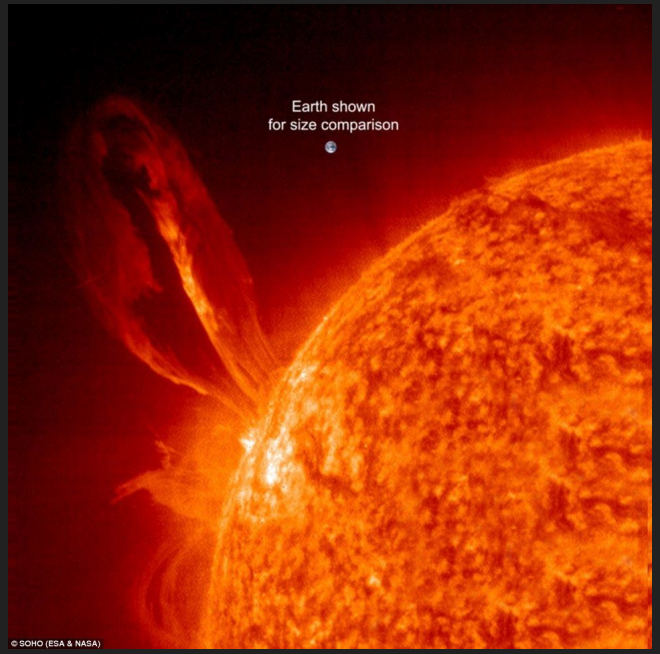


How big is the universe?

The universe is soooo big. Everything we can see is one billion billion billion times bigger than you!

Here is a picture of a solar flare!

Now let's go look at it!



Let’s take a look at the Universe

Let’s look at our neighborhood in the Universe:

https://eyes.nasa.gov/apps/solar-system/#/home

Now, let’s look at the whole thing:

https://neal.fun/size-of-space/

Twinkle Twinkle Little Star, How I Wonder What You Are

Our Sun is a star too!!

Stars are giant glowing spheres of very hot gas

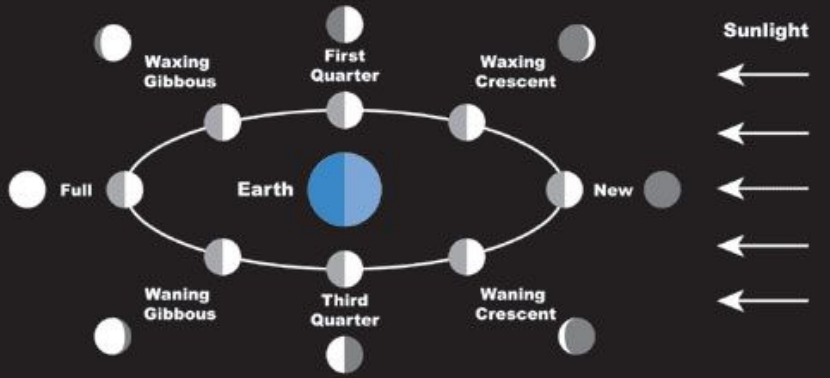
They are mostly made up of 2 gases, hydrogen and helium

Can you name any other stars?

https://stars.chromeexperiments.com/

Goodnight Moon

- The moon is the largest visible object in our night sky
- It glows in the dark because it reflects sunlight off its surface
- The moon looks like it has different shapes sometimes due to different parts of it being lit up by the sun
    - These shapes are called the phases of the moon



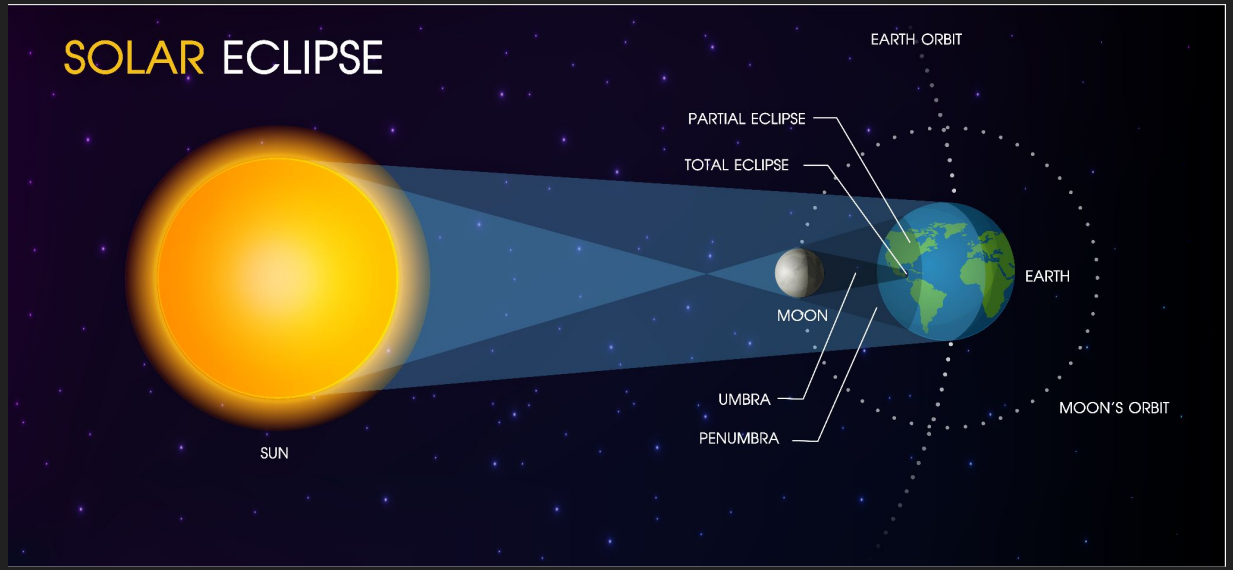
Did you know that we always see the same side of the Moon?

But wait, how is that possible, if the moon is going around us in circles?

What is an Eclipse?

It happens when the stars align:

- The moon casts a shadow on the Earth!



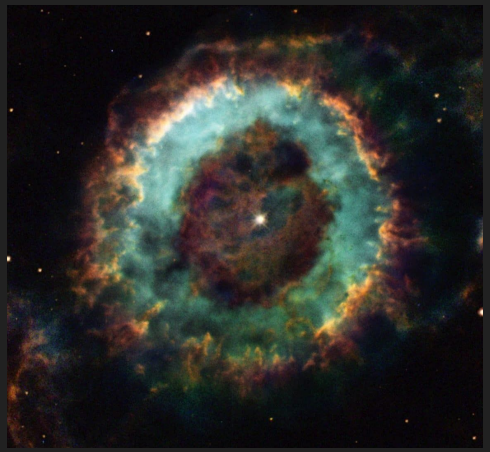
Eclipse Videos!

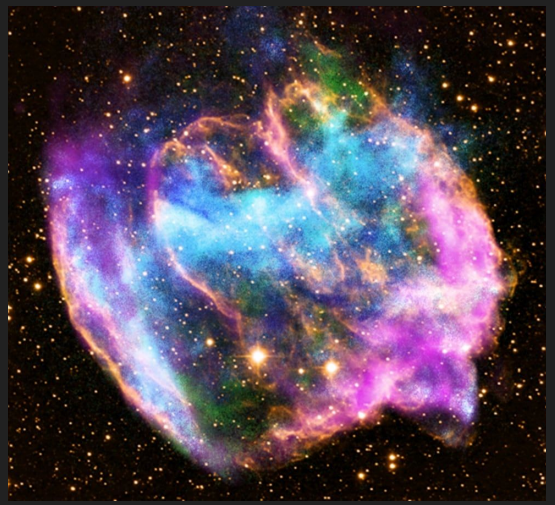
Who wants to see this with VR?!

Do Stars ever go away? YES!

Many stars EXPLODE when they get old!

- 30 time brighter than our entire galaxy
- Almost all elements in the universe come from Supernovas





Everything we see is millions of years old

Light is not instant - it takes time to move, just like you and me!

Everything in space is so far away, that it takes hundreds or thousands of years for the light to get here!

- So, we can only see how something LOOKED many years ago!

How long do we think it takes light to go from the Sun to planet Earth?

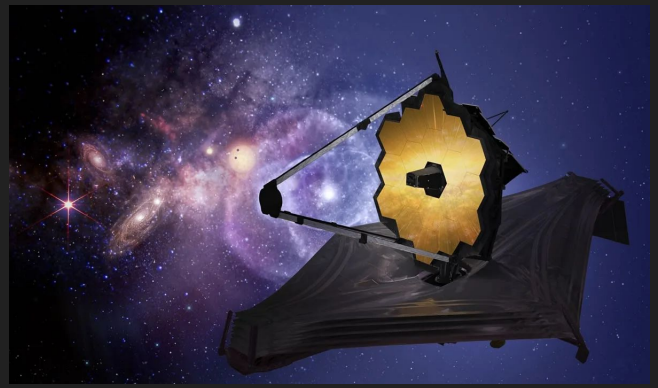
Mysterious Black Holes

- Black holes come from supernovas
- We can’t see black holes!!
  - Their gravity is so strong, that not even Light is fast enough to get away!
- We know they exist because scientists study how the strong gravity affects the stars and gases around the black hole

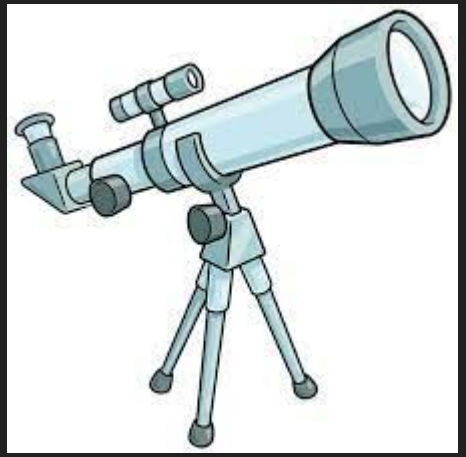
How do we study the universe?

Astronomers use many different types of telescopes to discover what's happening in the universe

Hubble Space Telescope



James Webb Telescope

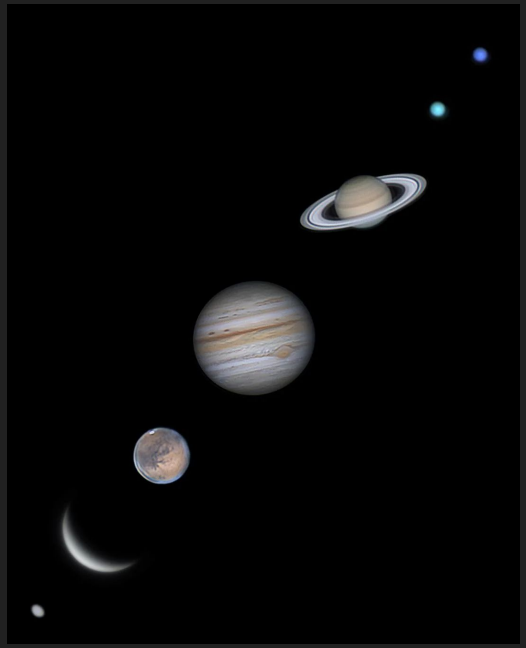


Backyard Telescope

What can you see using a telescope?

The Moon

Stars



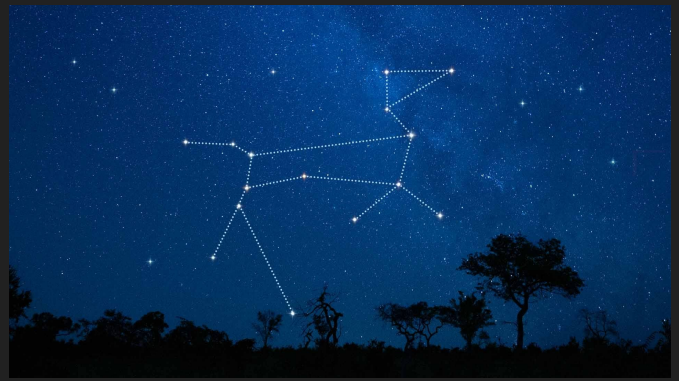
Planets

What if I don’t have a telescope?

There are so many things that you can see with just your eyes!

Meteors
(Shooting Stars)

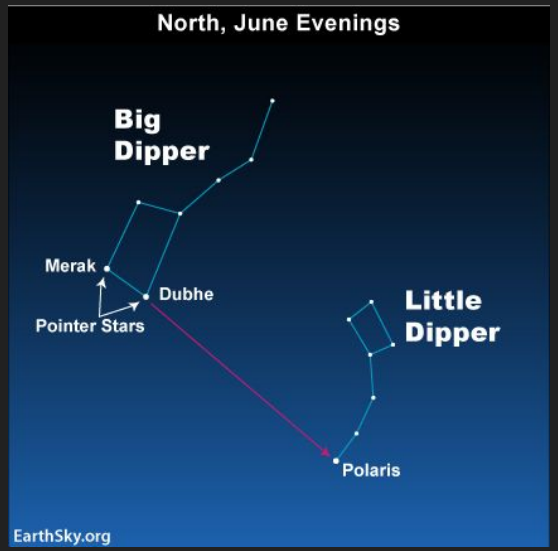
Constellations

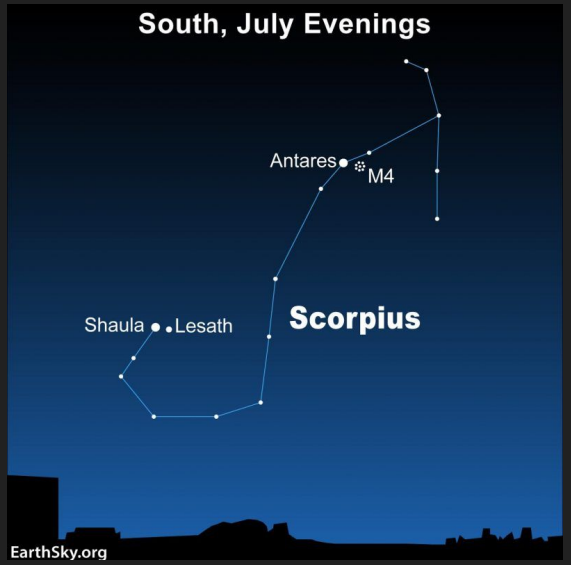


The Moon and Planets

What is a constellation?

A constellation is a group of stars that you can connect together to make a picture in the sky





What can we see in the sky tonight?

It’s time for us to become junior astronomers and explore tonight’s sky!

What do you think we’ll see?

Experiment with these things yourself!

https://www.solarsystemscope.com/

https://phet.colorado.edu/sims/html/my-solar-system/latest/my-solar-system_all.html

Video from the Sun’s atmosphere:

https://www.youtube.com/watch?v=TLeoi2pK3pY