

Name \_\_\_\_\_ Test Date \_\_\_\_\_ Hour \_\_\_\_\_

## ASTRONOMY#4 - NOTEBOOK

# The Moon, the Stars & the Galaxy

## LEARNING TARGETS



- I can describe the similarities and differences between the Earth and the Moon.
- I can explain how craters are formed.
- I can describe the different Moon Phases and explain why we see them this way.
- I can explain eclipses and identify the difference between a lunar and solar eclipse.
- I can describe stars.
- I can compare stars using the HR diagram.
- I can explain why all stars except Polaris move across the night sky.
- I can explain why we can't see the shape of the Milky Way Galaxy from Earth.
- I can explain the difference between a planet, a solar system, a galaxy and the universe.

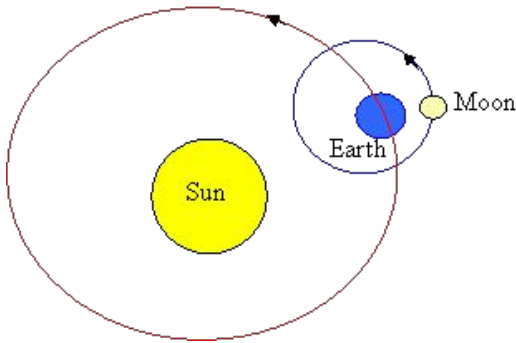
## SCIENTIFIC LANGUAGE

1. **Crater** - A large, bowl-shaped cavity on the surface of a planet or the moon, typically caused by the impact of a meteorite, asteroid or comet.
2. **Waxing Moon** - A little bit more of the Moon is visible each night.
3. **Crescent Moon** - A sliver of the Moon is visible, more than none, but less than half.
4. **Gibbous Moon** - When more than half, but less than the full Moon is visible.
5. **Waning Moon** - When less and less of the Moon is visible each night.
6. **Eclipse** - When our view of one object in the sky is blocked by either another object or the Earth's shadow.
7. **Stars** - A huge sphere of very hot, glowing gas producing its own light and heat energy by a process called nuclear fusion.
8. **Polaris** - The North Star which is perfectly aligned with the rotational North Pole.
9. **HR Diagram** - A scatter graph used to explain the brightness, temperature and classes of stars.
10. **Galaxy** - A large group of stars, dust, gas and dark matter held together by gravity.
11. **Milky Way** - The spiral galaxy that contains our solar system.
12. **Universe** - Everything that exists, including planets, stars, galaxies and all forms of matter and energy.

# Our Moon

## Moon Characteristics

The moon is our only natural \_\_\_\_\_. Ever since the moon formed, about \_\_\_\_\_ years ago, it has been inching away from our planet by about \_\_\_\_\_ centimeters per year. Like the Earth, the Moon \_\_\_\_\_, but much \_\_\_\_\_. The moon takes \_\_\_\_\_ to make one full rotation. So a 'lunar day' is almost an Earth \_\_\_\_\_ long!



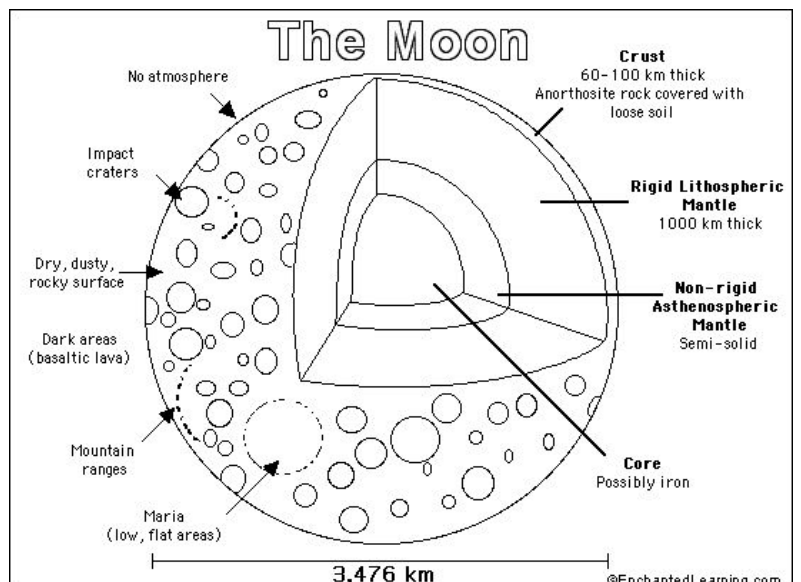
Just like the Earth orbits the Sun in a \_\_\_\_\_ direction the moon also orbits around the Earth in a \_\_\_\_\_ direction. This orbit or revolution around the Earth takes the \_\_\_\_\_ amount of time as its \_\_\_\_\_, 27.3 days. Since the time it takes to make \_\_\_\_\_ rotation and \_\_\_\_\_ revolution are the same, something

\_\_\_\_\_ happens. The \_\_\_\_\_ side of the Moon is always facing us. We never see the '\_\_\_\_\_ ' of the moon.

Seeing that the Moon is \_\_\_\_\_ than Earth, it has less \_\_\_\_\_ than Earth. The Moon also has a much \_\_\_\_\_ magnetic field. This means it is not \_\_\_\_\_ from the solar winds like Earth is. Therefore, the moon has very little \_\_\_\_\_. Without an atmosphere incoming meteors don't \_\_\_\_\_, instead they hit the surface of the moon at \_\_\_\_\_ covering it in craters. A

\_\_\_\_\_ is large, bowl-shaped cavity on the surface of a planet or the moon, typically caused by the impact of a \_\_\_\_\_, \_\_\_\_\_ or \_\_\_\_\_.

\_\_\_\_\_ craters are some of the most \_\_\_\_\_ features that can be seen on the Moon. The Moon's 4.5 billion year \_\_\_\_\_ has been recorded in these craters.

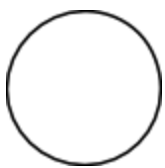


# Moon Phases

Watching the moon each night, you may notice that its appearance \_\_\_\_\_ throughout the month. When you see the " \_\_\_\_\_", you are seeing the \_\_\_\_\_ light reflecting or \_\_\_\_\_ the surface of the Moon since the Moon does \_\_\_\_\_ give off its own light.

Even though the Moon is always \_\_\_\_\_ and the Sun's light is always \_\_\_\_\_ off of it, we don't always see it as round. As the moon revolves around the Earth, we are able to see different \_\_\_\_\_, or ' \_\_\_\_\_', of the Moon's \_\_\_\_\_ side. We call these different 'shapes' the \_\_\_\_\_. The phases depend on the positions of the \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_ in relation to each other. Every \_\_\_\_\_ days the Moon \_\_\_\_\_ through the Moon Phases.

## New Moon -

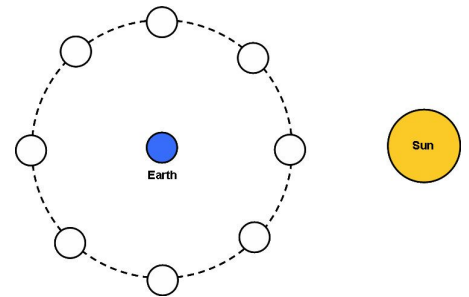


When the \_\_\_\_\_ is between the \_\_\_\_\_ and the \_\_\_\_\_.

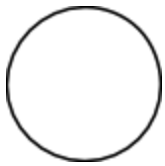
The side of the moon facing the Earth is \_\_\_\_\_ illuminated.

We \_\_\_\_\_ see the moon during this phase.

The moon is up throughout the \_\_\_\_\_, and down throughout the \_\_\_\_\_.



## Waxing Crescent -



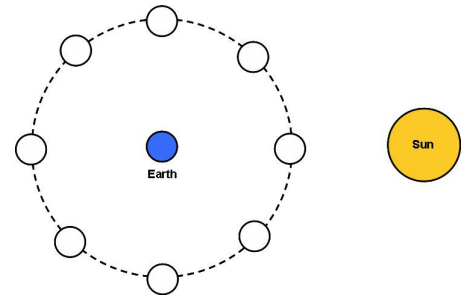
When the moon is moving \_\_\_\_\_ from the Sun.

Part of the Moon is beginning to \_\_\_\_\_.

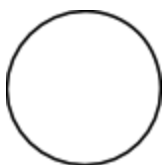
This lunar \_\_\_\_\_ can be seen each

evening for a few minutes just after \_\_\_\_\_.

We say that the Moon is " \_\_\_\_\_" because each night a little bit \_\_\_\_\_ is visible for a little bit \_\_\_\_\_.



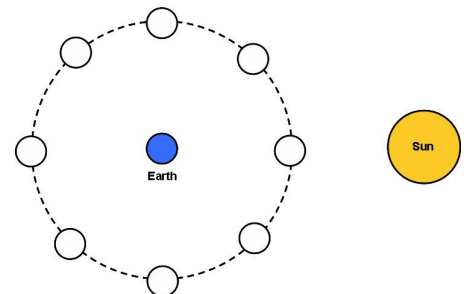
## First Quarter -



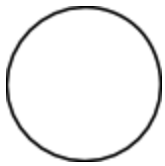
When the Moon is \_\_\_\_\_ the Earth, \_\_\_\_\_ of its way around its path.

During first quarter, \_\_\_\_\_ of the moon is visible.

The moon is seen for the first half of the \_\_\_\_\_, and then goes down.



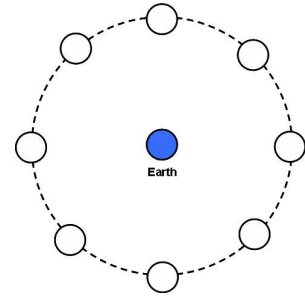
## Waxing Gibbous -



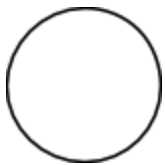
When more than \_\_\_\_\_, but less than \_\_\_\_\_ of the Moon is visible we say it is a \_\_\_\_\_ Moon.

You can see \_\_\_\_\_ a little sliver of the moon.

During this phase, the Moon remains in the sky \_\_\_\_\_ of the night.



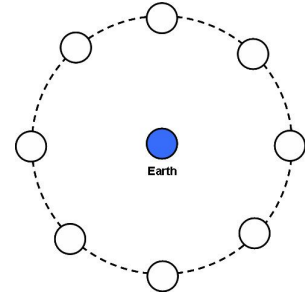
## Full Moon -



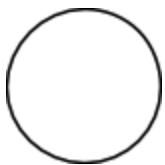
When the \_\_\_\_\_ is between the \_\_\_\_\_ and the \_\_\_\_\_.

We can observe the \_\_\_\_\_ illuminated face of the moon.

A full moon will rise just as the evening \_\_\_\_\_, and will set about the time \_\_\_\_\_ is ushered in.



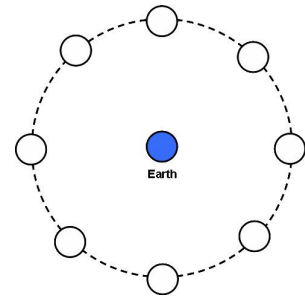
## Waning Gibbous -



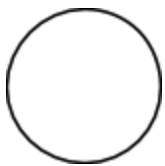
When the Moon is moving \_\_\_\_\_ the Sun.

We can see \_\_\_\_\_ a sliver of the Moon.

"\_\_\_\_\_ " means we begin to see \_\_\_\_\_ and \_\_\_\_\_ of the Moon each night.

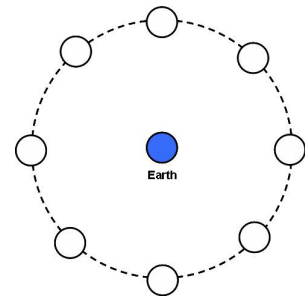


## Third Quarter -

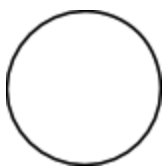


When the Moon is \_\_\_\_\_ the Earth, \_\_\_\_\_ of its way around its path.

We can see exactly \_\_\_\_\_ of the Moon's lighted surface.



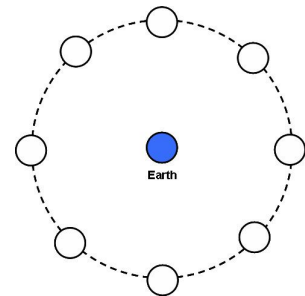
## Waning Crescent -



When you can only see a small \_\_\_\_\_ of the Moon.

The Moon is only visible just before \_\_\_\_\_.

Each night \_\_\_\_\_ of the Moon is visible for less \_\_\_\_\_.



# Eclipses

## Blocking out the Sun's Light

Sometimes during their orbits, the \_\_\_\_\_ and the \_\_\_\_\_ form a line with the \_\_\_\_\_. When this happens, an \_\_\_\_\_ occurs. An eclipse is when our view of one object in the sky is \_\_\_\_\_ by either another object or the Earth's \_\_\_\_\_. There are two kinds of eclipse - \_\_\_\_\_ and \_\_\_\_\_.

### Lunar Eclipse -

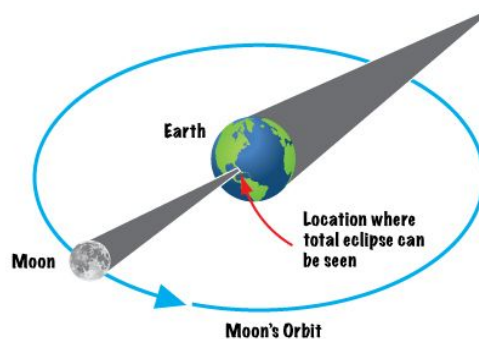
When the \_\_\_\_\_ moves between the \_\_\_\_\_ and the \_\_\_\_\_. The Earth \_\_\_\_\_ part of the Sun's light from reaching the \_\_\_\_\_. We will see the Earth's \_\_\_\_\_ on the moon.



### Solar Eclipse -

When the \_\_\_\_\_ moves between the \_\_\_\_\_ and the \_\_\_\_\_. The Moon \_\_\_\_\_ part of the Sun's light from reaching the \_\_\_\_\_. We will see the sky slowly gets \_\_\_\_\_ as the Moon moves in front of the \_\_\_\_\_. When the Moon and Sun are in a \_\_\_\_\_ line, it is called a \_\_\_\_\_ eclipse. These are very \_\_\_\_\_. Most people only see \_\_\_\_\_ in their lifetime.

### SOLAR ECLIPSE



# The Stars

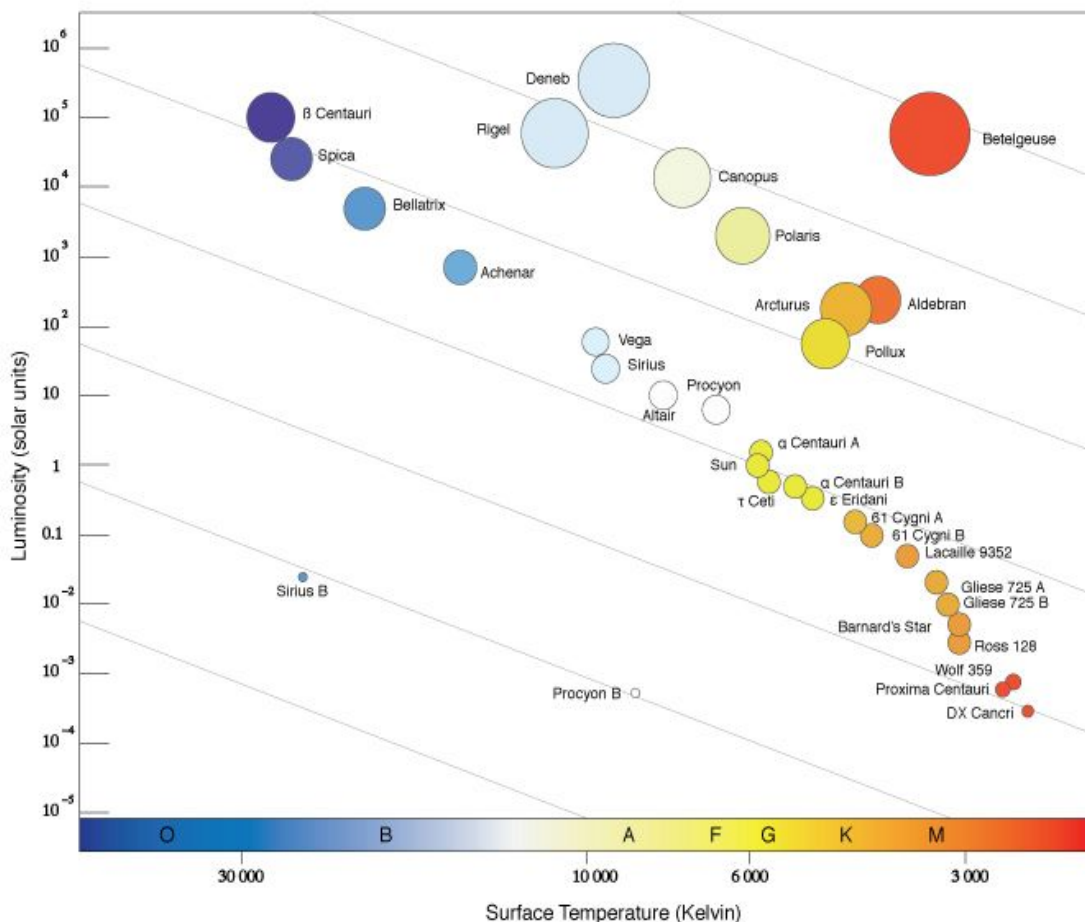
## What are Stars?

A star is a huge sphere of very \_\_\_\_\_, glowing \_\_\_\_\_. Stars produce their own \_\_\_\_\_ and \_\_\_\_\_ energy by a process called \_\_\_\_\_. Nuclear fusion happens when lighter elements are forced \_\_\_\_\_ to become \_\_\_\_\_ elements. When this happens, a tremendous amount of \_\_\_\_\_ is created causing the star to \_\_\_\_\_ and \_\_\_\_\_. At the \_\_\_\_\_ of our solar system there is a star that we call our Sun. On earth we receive the \_\_\_\_\_ and \_\_\_\_\_ created from the Sun's \_\_\_\_\_.

## Star Characteristics

Stars come in a variety of \_\_\_\_\_ and \_\_\_\_\_. Our Sun is an \_\_\_\_\_ sized \_\_\_\_\_ star.

This is an example of the Hertzsprung-Russell diagram, or \_\_\_\_\_, first used in 1912. Two astronomers, Ejnar Hertzsprung from \_\_\_\_\_ and Henry Russell from the \_\_\_\_\_, both discovered that the \_\_\_\_\_ of a star depends on the surface \_\_\_\_\_ of the star.



They came up with this diagram that explains the \_\_\_\_\_,  
 \_\_\_\_\_ and \_\_\_\_\_ of stars.

**Y-axis** The scale on the left shows how \_\_\_\_\_ a star is. We call this Star Luminosity or \_\_\_\_\_.

**X-axis** The letters across the bottom represent the \_\_\_\_\_ of stars.

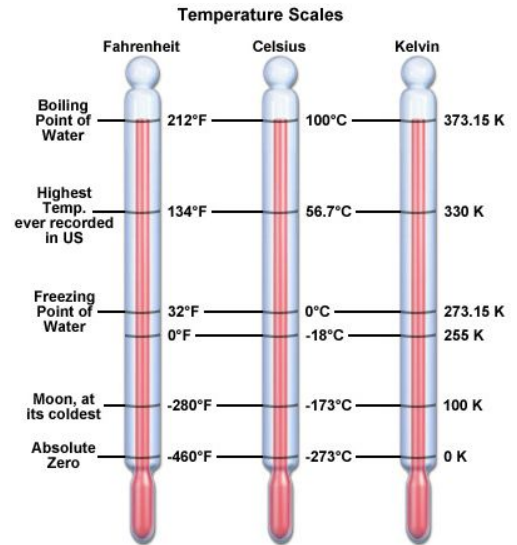
**O** (Blue), **B** (Blue/White), **A** (White), **F** (White/Yellow), **G** (Yellow), **K** (Orange), **M** (Red)

The \_\_\_\_\_ of the stars measured across the bottom of the scale is measured in \_\_\_\_\_.

Most stars in our universe are in the \_\_\_\_\_, including our \_\_\_\_\_.

Notice how the biggest stars are the \_\_\_\_\_, but not the \_\_\_\_\_. The white dwarf stars are near the end of their life and losing much of their \_\_\_\_\_, but they are very \_\_\_\_\_.

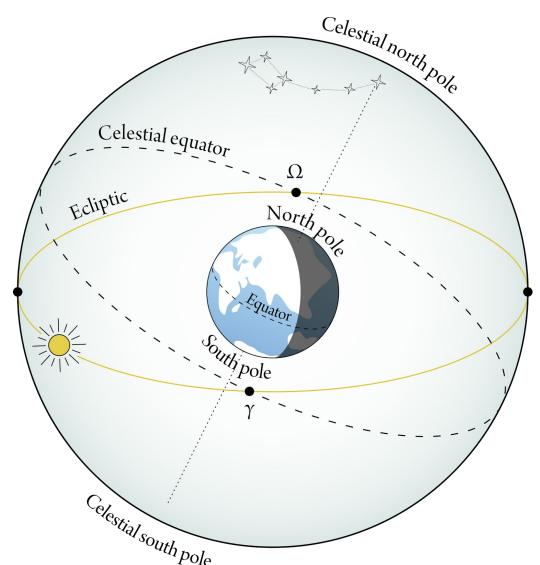
<http://www.kidsastronomy.com/stars.htm>



## Movement of Stars in the Sky

When we look up at the night sky we can see the \_\_\_\_\_. The stars seem to \_\_\_\_\_ across the night sky just like the \_\_\_\_\_ moves across the daytime sky. The stars at night \_\_\_\_\_ actually moving, but we see them this way because of the Earth's \_\_\_\_\_. The stars appear to \_\_\_\_\_ and \_\_\_\_\_ as they cross the night sky, because the Earth is \_\_\_\_\_ on its \_\_\_\_\_.

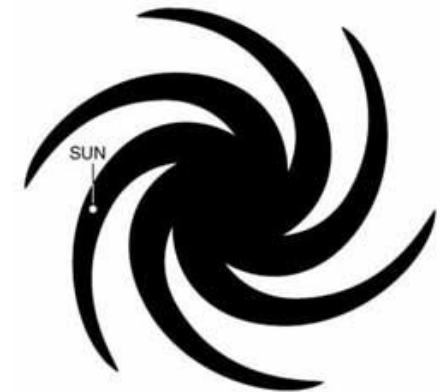
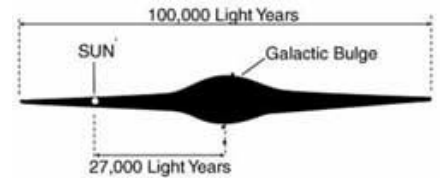
There is one star that we \_\_\_\_\_ see move. This is \_\_\_\_\_, or the north star. Polaris is the star at the end of the \_\_\_\_\_. The reason we don't see Polaris \_\_\_\_\_ like all of the other stars is because it is perfectly \_\_\_\_\_ (lined up) with the Earth's geographic \_\_\_\_\_.



# The Galaxies and the Universe

The Earth, the Moon, the Sun and the rest of our Solar System are all part of a larger system called a \_\_\_\_\_. A galaxy is a large group of \_\_\_\_\_, dust, \_\_\_\_\_ and dark matter held together by \_\_\_\_\_. They vary in \_\_\_\_\_ containing \_\_\_\_\_ to a \_\_\_\_\_ of stars. They form in different shapes such as \_\_\_\_\_ galaxies and \_\_\_\_\_ galaxies.

We live in a \_\_\_\_\_ galaxy called the \_\_\_\_\_. A spiral galaxy is a galaxy in which the stars and gas clouds are concentrated mainly in one or more \_\_\_\_\_. Every time you gaze at the night sky, you are looking at the \_\_\_\_\_ in the Milky Way Galaxy. We can't see the \_\_\_\_\_, because we are \_\_\_\_\_ one of the spiral arms of the galaxy. We do know from images that the Milky Way is a \_\_\_\_\_ system of stars, with a central \_\_\_\_\_. We cannot travel \_\_\_\_\_ our galaxy to see what it really looks like because the distance (over 100,000 light years) is \_\_\_\_\_ to travel. We use our \_\_\_\_\_ of the shapes of other galaxies, and \_\_\_\_\_ the Milky Way must be a version of a spiral-type galaxy.



The \_\_\_\_\_ telescope has revealed about 100 \_\_\_\_\_ galaxies. All of these galaxies make up an even larger system called the \_\_\_\_\_. The universe, or the \_\_\_\_\_, is all of the existing \_\_\_\_\_ and \_\_\_\_\_ believed to be at least 10 \_\_\_\_\_ light years in diameter and about 13 \_\_\_\_\_ years old.

## Lets start from the beginning:

The Earth revolves around the \_\_\_\_\_.

The Sun in turn revolves or circles the center of the \_\_\_\_\_.

Our galaxy is part of a group of galaxies called the \_\_\_\_\_.

The local group of galaxies are all part of a bigger cluster of galaxies called the \_\_\_\_\_.

Now here is where it gets fun.

Millions of galaxy clusters around the \_\_\_\_\_ are strung together like a \_\_\_\_\_.

If you could look at the entire universe at once it would look like a giant spiderweb, made up of billions of \_\_\_\_\_, and trillions and trillions of \_\_\_\_\_.