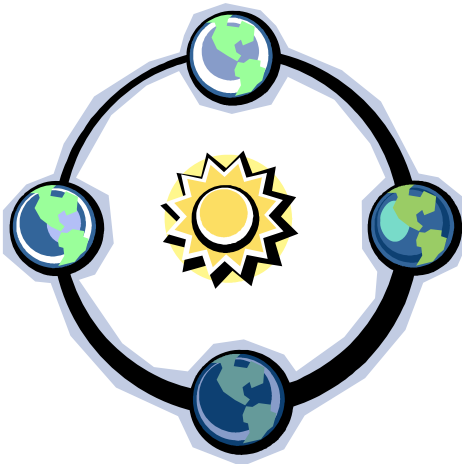


# Spaceship Earth

## Pre-Visit Activities

6<sup>th</sup> grade



# Activities

These activities are intended for use before your visit to the Virginia Air and Space Center. It is beneficial for the students to have some prior knowledge about the content area covered in the program. All of the activities can be tailored to your specific classroom needs, and the procedures listed are suggestions for teaching.

## Activity 1: Early Astronomers

Explain to the students that we know that the Earth and other planets revolve around the sun, but that it took many years for astronomers, and much persecution, to come up with and prove that theory. Some astronomers had different theories, and others were imprisoned for their beliefs and studied in secret.

Look over the information sheet on Ptolemy, Aristotle, Copernicus, and Galileo as a group, or have the students do it in small groups or individually. Complete the activity sheet and timeline.

## Activity 2: The Planets

Thanks to astronomers and scientists, we know where the planets are, their sizes and their distances from the sun. These distances are million and billions of kilometers, and are difficult to comprehend. With this activity, you can use a gymnasium or a playground, and some familiar materials to make your own solar system model brought down to scale.

Use the planets information sheet and planetary distance instructional sheet to help your students have a better understanding of our Solar System.

## Activity 3: Gravity

Sir Isaac Newton discovered gravity. Gravity is what keeps us grounded on the Earth and it keeps Earth and the planets orbiting around the Sun.

Read the general information about gravity, then use some of the suggested websites to perform some experiments with your students.

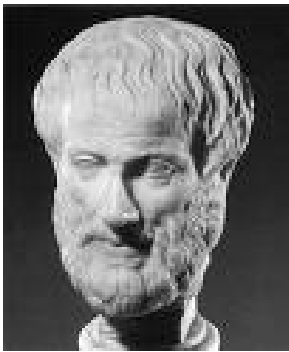
# Activity 1: Early Astronomers

Use the following websites for each astronomer, and answer the questions about each.

## Aristotle

[http://www.kidspoint.org/columns2.asp?column\\_id=1078&column\\_type=homework](http://www.kidspoint.org/columns2.asp?column_id=1078&column_type=homework)

<http://www.childrensmuseum.org/cosmicquest/fieldguide/astronomers.html> (click on Ancient, then read about Aristotle)



When and where did Aristotle live? \_\_\_\_\_

What was Aristotle's theory about the universe? \_\_\_\_\_

\_\_\_\_\_

Why was his theory taught for so long? \_\_\_\_\_

\_\_\_\_\_

## Ptolemy

[http://www.kidspoint.org/columns2.asp?column\\_id=1078&column\\_type=homework](http://www.kidspoint.org/columns2.asp?column_id=1078&column_type=homework)

<http://www.timelineindex.com/content/view/887>

When and where did Ptolemy live? \_\_\_\_\_

What was his profession? \_\_\_\_\_

What was his theory about the universe? \_\_\_\_\_

\_\_\_\_\_

What does the word "geocentric" mean? \_\_\_\_\_

Why were Ptolemy's theories accepted for many centuries? \_\_\_\_\_

\_\_\_\_\_



## Copernicus

<http://www.childrensmuseum.org/cosmicquest/fieldguide/astronomers.html> (click on Renaissance and read about Copernicus)

[http://www.kidspoint.org/columns2.asp?column\\_id=1078&column\\_type=homework](http://www.kidspoint.org/columns2.asp?column_id=1078&column_type=homework)



When and where did Copernicus live? \_\_\_\_\_

What was his profession? \_\_\_\_\_

What was his theory? \_\_\_\_\_  
\_\_\_\_\_

What does “heliocentric” mean? \_\_\_\_\_

Why did Copernicus keep his theories quiet and not publish them? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Galileo

<http://www.childrensmuseum.org/cosmicquest/fieldguide/astronomers.html> ((click on Renaissance and read about Galileo)

[http://www.kidspoint.org/columns2.asp?column\\_id=1078&column\\_type=homework](http://www.kidspoint.org/columns2.asp?column_id=1078&column_type=homework)

When and where did Galileo live? \_\_\_\_\_

What was his profession? \_\_\_\_\_

What other astronomer’s theories did he believe in? \_\_\_\_\_  
\_\_\_\_\_

What evidence did he find to prove the astronomer’s theory correct?  
\_\_\_\_\_  
\_\_\_\_\_

Galileo was persecuted (put on trial and imprisoned) for his beliefs.  
Why? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



## Activity 2: The Planets

Use the following charts and materials to make your own Solar System.

The sun and planets are millions and billions of miles away from us. In order to have a better understanding of the size of the planets and their distances from the Sun, and Earth, we are going to shrink everything down. In the chart below, you will see the distances in kilometers of the planets from the Sun. Next you will see the distance in Astronomical Units, which is a unit of length based on the distance from the Earth to the Sun. Then, depending on the available space you have, there are distances in inches and feet for you to make your own solar system. These distances (for a 40 foot space and 100 foot space) are based on the equation 1 foot = 1 A.U. You may just use the numbers on the chart, or your students can do the math to figure out the distances themselves based on the A.U. numbers and the equation. Lastly, there are common objects listed to be used as scaled down models. Have the students hold the objects and stand at the correct distances as you make your own Classroom Solar System.

<b>Planet</b>	<b>Average Distance from Sun</b>	<b>Distance in Astronomical Units (A.U.)</b>	<b>Scaled distances (in inches and feet) for a 40 foot space (1 foot = 1 A.U.)</b>	<b>Scaled distances (in inches and feet) for a 100 foot space (1 foot = 1 A.U.)</b>	<b>Objects for planet model</b>
<b>Sun</b>	0	0	0	0	small stability ball
<b>Mercury</b>	57,910,000 km	0.39 A.U.	5 inches	11 inches	marble
<b>Venus</b>	108,200,000 km	0.72 A.U.	9 inches	1 ft. 10 in.	walnut
<b>Earth</b>	149,600,000 km	1.00 A.U.	1 ft.	2 ft. 6 in.	golf ball
<b>Mars</b>	227,940,000 km	1.50 A.U.	1 ft. 6 in.	3 ft. 10 in.	acorn
<b>Asteroid Belt</b>					
<b>Jupiter</b>	778,330,000 km	5.20 A.U.	5 ft. 3 in.	13 ft. 2 in.	basketball
<b>Saturn</b>	1,429,400,000 km	9.50 A.U.	9 ft. 6 in.	24 ft. 2 in.	soccer ball
<b>Uranus</b>	2,870,990,000 km	19.20 A.U.	19 ft. 3 in.	48 ft. 7 in.	softball*
<b>Neptune</b>	4,504,300,000 km	30.10 A.U.	30 ft. 1 in.	76 ft. 2 in.	grapefruit*
<b>Pluto</b>	5,913,520,000 km	39.50 A.U.	39 ft. 6 in.	100 ft.	bean

**\*if grapefruit is larger than softball, then switch places for these two.**

## Activity 3: Gravity

We've all heard of Sir Isaac Newton and the famous apple. Although many believe the apple hit him on the head, it actually only fell to the ground from a tree on his orchard. But the event made him think about why it happened, and he set out to find the answers.

What he discovered is gravity. This is an invisible force that attracts the centers of two objects together. Every object in the universe is affected by gravity. The amount of gravity depends on the mass of the object and its size. The more mass an object has the more gravitational pull it has. The reason we, and other objects, stay on the Earth is because the Earth (which is more massive than us) has a strong gravitational pull, so it is pulling us to its center.

Gravity keeps the planets in orbit around the Sun. The Sun is so massive that it has a strong gravitational pull. The planets are being pulled to it and stay in orbit around it because they are moving fast enough to not fall into the Sun. This is the same reason our moon and other satellites stay in the Earth's orbit. They are moving at just the right speed that they will not fall into Earth.

The Internet is full of information and great activities to use for teaching gravity.

These are the recommended sites with information and activities. Have fun!

<http://ellerbruch.nmu.edu/classes/cs255f03/cs255students/jedens/P4/teachfacts.html>  
(simple info about gravity geared toward middle school)

<http://www.kidskonnnect.com/content/view/82/27/> (gravity info)

[http://www.kids-science-experiments.com/cat\\_gravity.html](http://www.kids-science-experiments.com/cat_gravity.html) (gravity experiments)

<http://www.abc.net.au/spark/experiments/s1090480.htm> (gravity experiment)

# Vocabulary

These terms are from this packet and will be covered in the program during your visit.

**Astronomer:** a person who studies the celestial bodies of the universe.

**Astronomical units:** a unit of length based on the distance from the Earth to the Sun

**Crescent moon:** the phase of the moon that is part way between a half moon and a new moon, or between a new moon and a half moon.

**Full moon:** a moon that appears as an entire circle in the sky

**Gibbous moon:** the phase of the moon is between a full moon and a half moon, or between a half moon and a full moon.

**Gravity:** the natural force of attraction between two massive bodies.

**Neap tide:** weaker tides that occur during quarter moons when the Moon and Sun are perpendicular to each other.

**New moon:** the phase of the moon when the Moon is not visible from Earth, because the side of the moon that is facing us is not being lit by the sun.

**Rotation:** The turning or spinning of a body about an axis running through it.

**Revolution:** The motion of one body around another (e.g. the motion of the planets in their orbit around the Sun).

**Spring tide:** stronger tides that occur during new moon and full moon, when the Earth, Sun and moon are in a line.

**Tides:** very long-period waves that move through the oceans in response to the forces exerted by the moon and sun

**Waxing moon:** a phase of the moon in which the face of the moon is getting larger (the time between a new moon and a full moon).

**Waning moon:** a phase of the moon in which the face of the moon is getting smaller (the time between a full moon and a new moon).

# Resources

## Places

Educator Resource Center  
NASA Langley Research Center  
Virginia Air and Space Center  
600 Settlers Landing Road  
Hampton, VA 23669-4033  
Phone: (757) 727-0900 Ext. 757  
FAX: (757) 727-0898  
<http://www.vasc.org/erc/>

## Websites

### The Planets and general space information

<http://www.childrensmuseum.org/cosmicquest/fieldguide/planets.html>

<http://www.shatters.net/celestia/index.html>

<http://www.windows.ucar.edu/>

[http://www.exploratorium.edu/ronh/solar\\_system/](http://www.exploratorium.edu/ronh/solar_system/)

<http://pds.jpl.nasa.gov/planets/welcome.htm>

<http://space.jpl.nasa.gov/>

### The Moon

[http://www.harcourtschool.com/activity/moon\\_phases/](http://www.harcourtschool.com/activity/moon_phases/)

### The Tides

<http://oceanservice.noaa.gov/education/kits/tides/welcome.html>

### The Seasons

<http://www.scienceu.com/observatory/articles/seasons/seasons.html>

<http://www.explorelarning.com/index.cfm?method=cResource.dspResourcesForCourse&CourseID=300>

[https://www.msu.edu/~russellr/portfolio/seasons\\_orbit/seasons\\_orbit\\_intro.html](https://www.msu.edu/~russellr/portfolio/seasons_orbit/seasons_orbit_intro.html)