
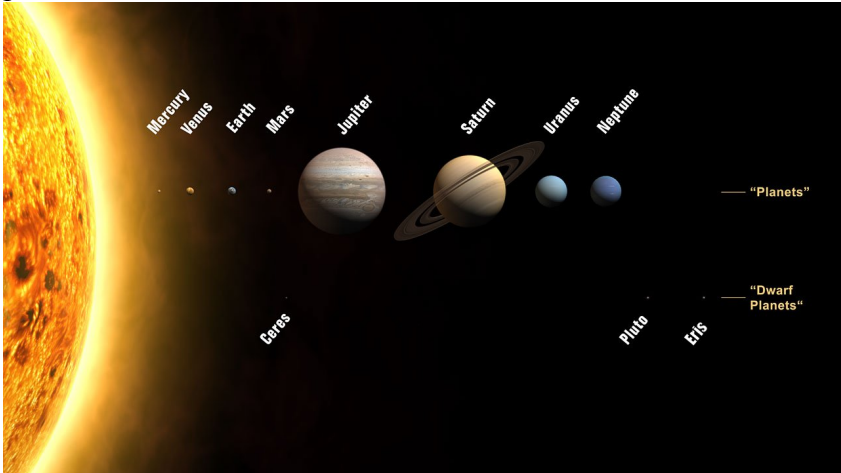


“The Sun and Our Solar System”
Newcomer Academy
Middle School
Visualization One

Chapter	Subtopic/Media	Key Points of Discussion	Notes/ Vocabulary
1	Thinking about Earth as a Planet	<p>Where are we at within the Universe?</p> <p>In the vast, expanding space known as the universe, humans reside on a small, rocky planet called Earth. Our planet is part of a discrete solar system in an arm of the spiral shaped Milky Way Galaxy. Our galaxy is only one of billions of other galaxies that exist within the universe.</p>  <p>How many planets are in our solar system?</p> <p>There are eight planets in our solar system and three dwarf planets.</p>  <p>Earth</p> <p>What makes the Earth so unique?</p> <p>The Earth is one of the four inner, rocky planets. It has one, fairly large moon (in terms of ratio to size). The Earth has a tilted axis (23.5 degrees), which gives it four distinct seasons. The Earth’s thin crust is also divided into plates and it possesses a large inner core made of iron (Fe).</p>	<p>Lesson 1</p> <p>Universe</p> <p>Milky Way Galaxy</p> <p>Planets</p> <p>Axis</p> <p>Unique</p>

Earth is **unique** because it is the only known planet to contain life. It also possesses water in its three forms. Some may say that having seasons is unique, but all of the planets have seasons due to varying tilted axis.

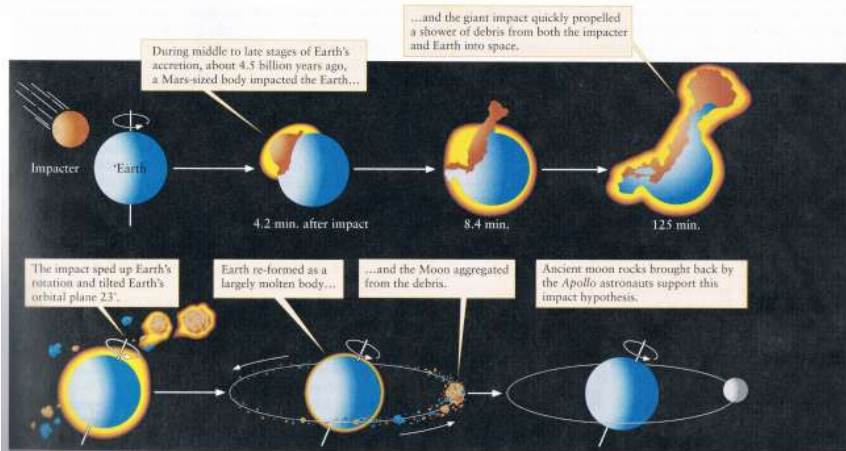
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Intro to Sun-Earth-Moon System

The Moon

How old is the Moon?

The **Moon** is estimated to be 4.5 billion years in age. Though there are many theories about the origin/**formation** of the Moon, one theory is becoming widely accepted. It is inferred that a Mars-sized object (planet named Thea) collided with the Earth about 100 million years after it formed. This collision caused **debris** to be cast into space. Though some of the debris came back to the Earth as part of its crust and large inner core, much of it remained in orbit around the Earth. **Gravity** caused the debris to “stick together” and form the Moon.



Our Sun the Star

How many stars are in our solar system?

There is only one **star**, the Sun, in our solar system. Our Milky Way Galaxy has over 200 billion stars, and the Universe has more stars than there are grains of sand on all of the beaches of the entire planet Earth.

The Sun, though an average size and temperature, is special because it is our star. It provides the heat and energy for everything on the planet Earth.

The Sun and Moon appear to be the same size in our sky, but that is due to the Sun being 400X further away. The Sun is bigger in **volume** than anything we can imagine. One million Earths would fit inside the Sun, and 109 Earths could lineup across its diameter.

Models of the Sun, Earth, and Moon

What are the sizes of the Sun, Earth, and Moon?

Object	Diameter	Earths Across
Sun	1,392,000 km	109
Moon	3500 km	0.27
Earth	12,756 km	1

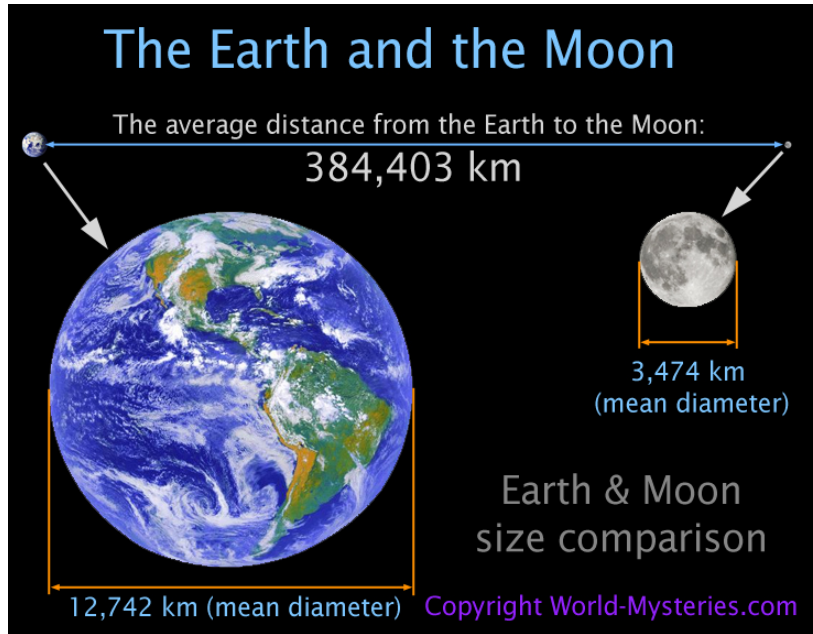
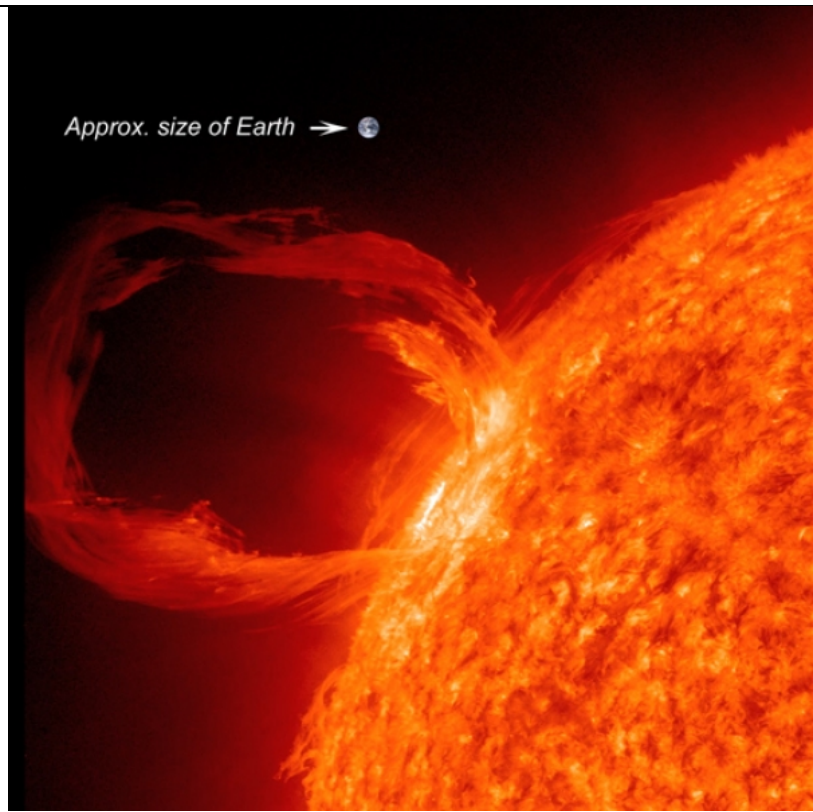
Lesson 2

Moon
Formation

Debris
Gravity

Star

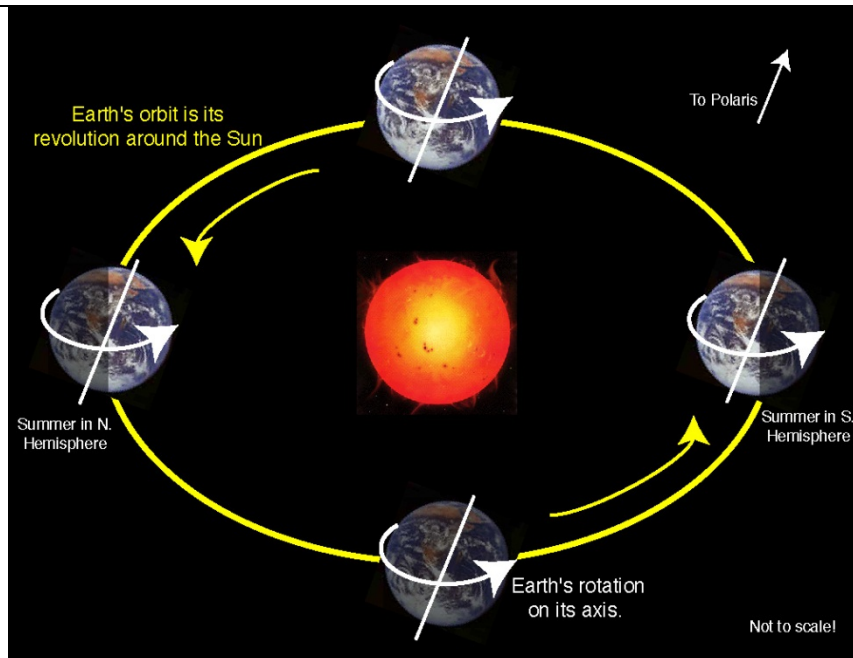
Volume



Distance from the Sun to the Earth
150,000,000 km or 93,000,000 miles or 8 light minutes (1 A.U.)

Distance from the Moon to the Earth
384,000 km or 238,900 miles or 1.3 light seconds

3	Rotation and Revolution (Earth and Moon)	<p>Rotation vs. Revolution What is the difference? Rotation is the spinning of an object (Earth, Moon, Sun) on its axis, while revolution is the orbiting of an object around another object (Earth around the Sun).</p>	Lesson 2 Rotation Revolution
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Calendar

Repetitive Cycle

Day

Month

Year

Leap Year

How long does it take the Earth to Rotate on its axis?

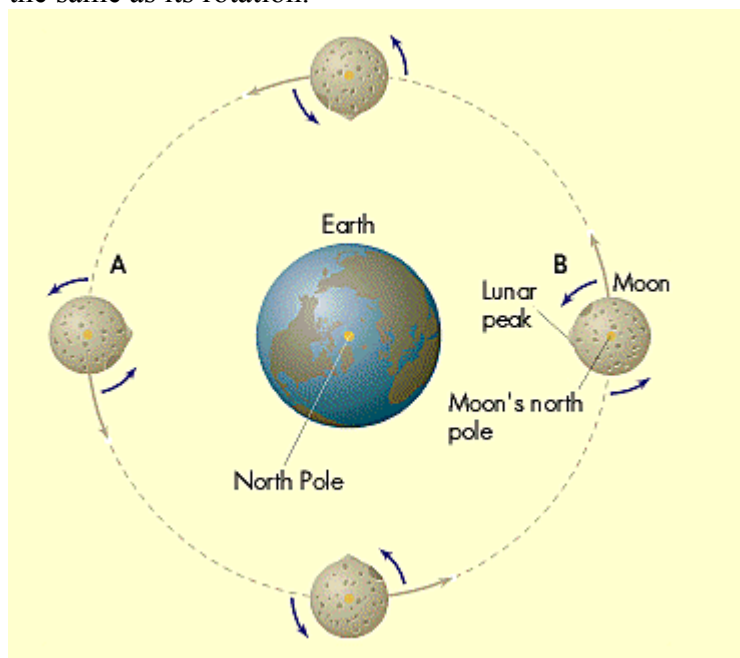
It takes the Earth ~24 hours to rotate one time.

How long does it take the Moon to Rotate on its axis?

The Moon takes ~27 days (one month) to make one rotation.

How long does it take the Moon to Revolve around the Earth?

The revolutionary period of the Moon is ~27 days (one month), the same as its rotation.



How long does it take the Earth to Revolve around the Sun?

It takes the Earth 365.25 days to orbit the Sun.

Natural Calendars

Day and Night

Day and night are caused by the Earth's rotation on its axis. It takes Earth approximately 24 hours to rotate on time. This **repetitive cycle** of light and dark provides a clocklike regularity

for measuring our days.

Month

The Moon takes approximately one month, about 27 days, to orbit the Earth. We observe the Moon's orbit by seeing its appearance change shape throughout each month (phases).



Year

It takes the Earth 365.25 days, or one year, to revolve around the Sun. Since a calendar year is 365 days long, we have an extra 0.25 day every year that needs to be accounted for. So every four years, we have a "**leap year**" in which we add an extra day to the calendar (February 29).

4

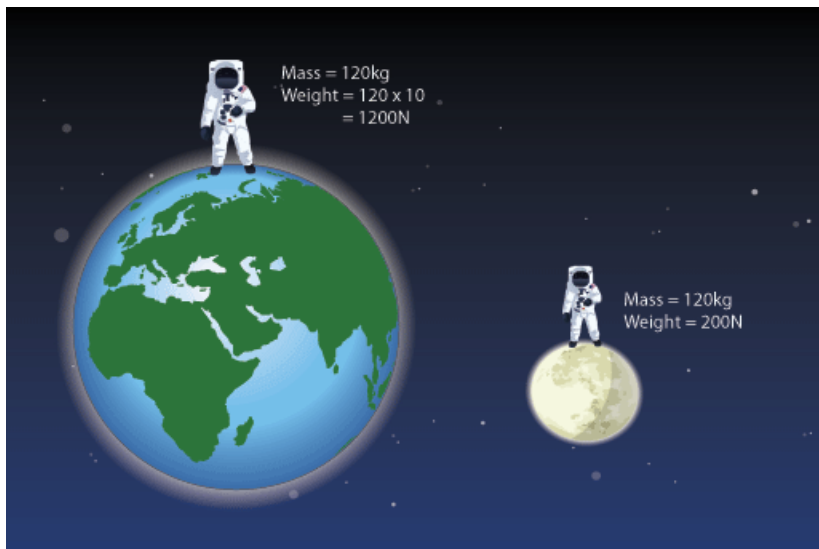
**Gravity and
Orbital Motion
(Earth)**

What is the difference between mass and weight?

Mass is the amount of **matter** (or "stuff") in an object, regardless of how much space the object takes up. An object's mass does not change due to location.

Weight is a measure of the force of **gravity** on an object. This can change depending on location in regards to an object's gravity.

An object, on Earth, with a weight of 36 kilograms will have lesser weight on the Moon, 6 kilograms. This occurs because the Moon has a weaker gravitational attraction (1/6). The same object would weigh 84.96 kilograms on Jupiter, because Jupiter's gravity is 2.36 times greater than the Earth's.



Lesson 14 + 15

Mass

Matter

Weight

Gravity

**Sir Isaac
Newton**

Orbit

Law of Inertia

Inertia

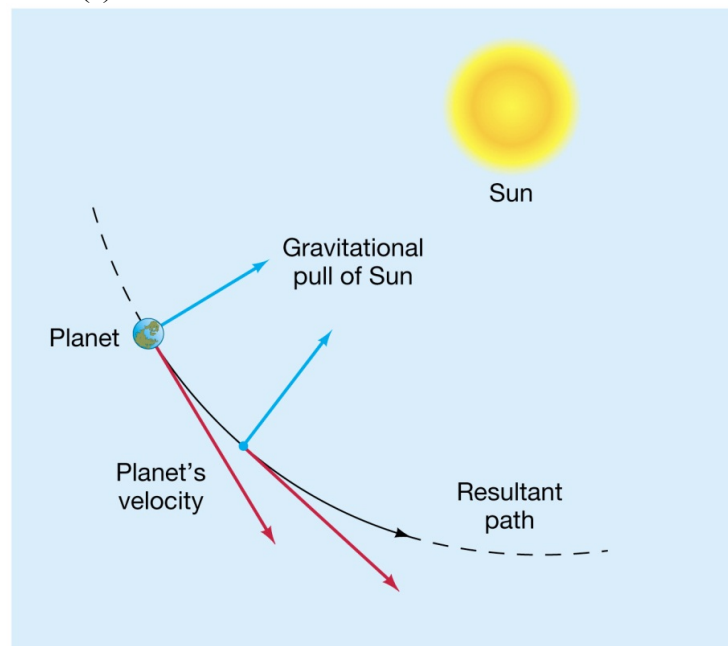
**Unbalanced
Force**

What keeps the planets and their moons, and thousands of asteroids and comets, in orbit around the Sun?

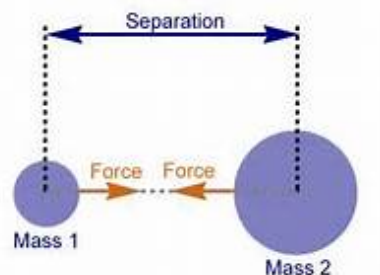
Gravity guides the movements of everything on Earth, and all the objects in space.

Sir Isaac Newton concluded that gravity must be an invisible force, like the one you can feel when you place a magnet near a metal object (although gravity is not as strong as electromagnetic forces). He also determined that gravity holds planets and moon in their **orbits**.

Newton wrote two famous laws about gravity: The **Law of Inertia** and the **Law of Universal Gravitation**. The Law of **Inertia** says that a body in motion tends to travel in a straight line unless it is disturbed by an **unbalanced force**. The Law of Inertia governs the motion of the planets and moons. If they weren't affected by gravity, they would travel in straight lines and leave the solar system. The Sun's gravity holds all the planets in orbit around it, and each planet's gravity captures and holds its moon(s) in orbit.



The Law of Universal Gravitation states that any two objects in the universe have gravity and will **attract** each other. The amount of attraction depends on the mass of each object, and the distance between the objects.



Law of Universal Gravitation

Attract