



CHAPTER 3 NOTES

The Sun, the Earth, the Moon System



EARTH

- A long time ago people believed the Earth was flat and at the center of the universe.
- Since then we have learned the Earth is a round 3 dimensional sphere.



AXIS OF THE EARTH

- The imaginary vertical line around which the Earth spins is known as its axis
- The spinning of Earth around its axis that causes day and night is called its rotation



MAGNETIC FIELD

- Earth has a magnetic field with north and south poles.
- There is an imaginary line joining Earth's magnetic poles called the magnetic axis.
- The location of these magnetic poles changes a little bit as time goes by.




CAUSES OF SEASONS

- Revolution is the Earth's yearly orbit around the Sun.
- Earth's orbit is an ellipse, or elongated closed circle.
- The distance between the Earth and the Sun changes during the year because the Sun is not centered in this elliptical pattern.



THE EARTH'S TILT CAUSES THE SEASONS

- There are two hemispheres on Earth – Northern and Southern
- The hemisphere tilted toward the Sun receives more daylight hours than the hemisphere tilted away from the Sun.
- One reason summer is warmer than winter is the longer periods of sunlight. The days are longer during summer.

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- Because the Earth is tilted the Sun's radiation hits the Earth at different angles
 - The hemisphere tilted toward the Sun receives more total solar radiation than the hemisphere tilted away from the Sun.
 - In the hemisphere tilted toward the Sun, the Sun appears high in the sky.



SOLSTICE

Solstice is the day when the Sun reaches its greatest distance north or south of the equator.

Winter solstice is on December 21 or 22 in the northern hemisphere.

Summer solstice is on June 21 or 22 in the northern hemisphere.



EQUINOX- DAY WHEN SUN IS DIRECTLY OVER EARTH'S EQUATOR

Spring

March 20 or 21

Fall

September 22 or 23

Daylight and
nighttime hours
are equal all over
the world

<https://www.ixl.com/science/grade-7/what-causes-the-seasons-on-earth>

THE SAME SIDE OF THE MOON ALWAYS FACES THE EARTH

THE MOON ROTATES ON ITS AXIS

The Moon's rotation takes 27.3 days

The Moon appears to shine because it reflects sunlight





Youtube song and video on the phases of the moon

<http://www.havefunteaching.com/shop/science-videos/moon-video-download>

You may want to play this catchy tune daily as we study chapter 3 –WARNING it's one of those songs that get in your head and you can't forget it. – but you'll remember the phases of the Moon.

THE MOON AND ITS' PHASES

New Moon Phase

When the Moon is between Earth and the Sun and cannot be seen



Waxing Moon

After a new moon, the phases begin waxing. Waxing means that more of the illuminated half of the Moon can be seen each night.

Waxing Crescent Phase

The Moon appears to be partly but less than one-half illuminated by direct sunlight. The fraction of the Moon's disk that is illuminated is increasing.



First Quarter Phase

One-half of the Moon appears to be illuminated by direct sunlight. The fraction of the Moon's disk that is illuminated is increasing.



Waxing Gibbous Phase

The Moon appears to be more than one-half but not fully illuminated by direct sunlight. The fraction of the Moon's disk that is illuminated is increasing.



Full Moon

The Moon's illuminated side is facing the Earth. The Moon appears to be completely illuminated by direct sunlight.



WANING PHASES – LESS OF THE ILLUMINATED HALF OF THE MOON IS VISIBLE AFTER THE FULL MOON

Waning Gibbous

The Moon appears to be more fully illuminated by direct sunlight. The fraction of the Moon's disk that is illuminated is decreasing.



Third Quarter

One half of the Moon appears to be illuminated by direct sunlight. The fraction of the Moon's disk that is illuminated is decreasing.



Waning Crescent

The Moon appears to be partly but less than one-half illuminated by direct sunlight. The fraction of the Moon's disk that is illuminated is decreasing.





The Moon completes its cycle of phases in about 29.5 days instead of 27.3 days because it is keeping up with Earth's revolution around the Sun

ECLIPSES – WHEN EARTH OR MOON CAST A SHADOW ON THE OTHER

Solar eclipse – when the Moon moves directly between Earth and the Sun, shadowing part of Earth.

Lunar eclipse – when Earth's shadow falls on the Moon



SOLAR ECLIPSE

Total Solar eclipse occurs under the Umbra, which is the darkest part of the shadow. A total eclipse is visible only on a small area of Earth.



A **Partial Solar Eclipse** occurs in the lighter shadow on Earth's surface called the penumbra.





LUNAR ECLIPSE

Total Lunar eclipse occurs if the Moon is completely in Earth's umbra

Partial Lunar eclipse occurs when only part of the Moon moves into Earth's umbra, or the moon is totally in the penumbra.

A total lunar eclipse is visible on the nighttime side of Earth when the night is clear.

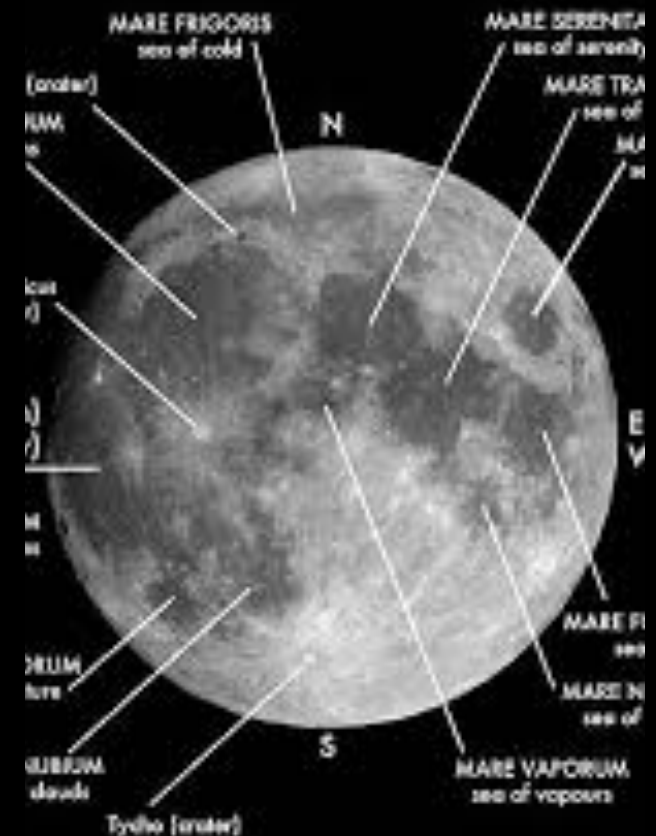
MOON'S SURFACE

Craters formed from meteorites, asteroids, and comets.

Maria – dark flattened areas of the Moon which were formed by cracks in the Moon's crust which released lava to fill large craters.

Igneous maria rocks are 3 to 4 billion years old

Data from moonquakes suggest that under the Moon's crust might lie a solid mantle, then a partly molten mantle and a solid core.





THEORY - AN IDEA USED TO
ACCOUNT FOR A SITUATION. IT'S
NEVER BEEN PROVEN FALSE

Impact Theory of Moon's origin – the Moon formed billions of years ago from Earth material thrown off when a large object collided with Earth.

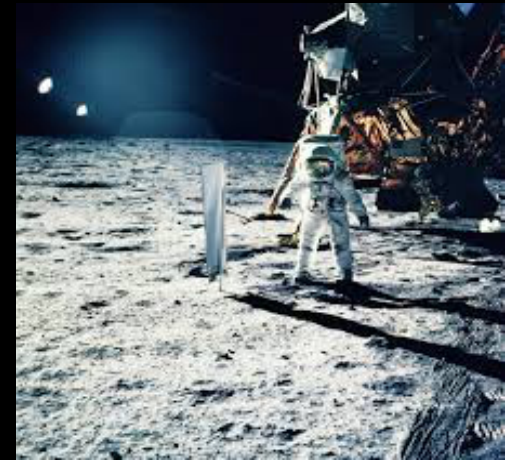
MISSIONS TO THE MOON



1958- Soviet Union launched Luna spacecraft.

1960's - U.S. Ranger spacecraft and Lunar Orbiter took detailed photographs of the Moon

U.S. landed 7 Surveyor spacecraft on the Moon



Apollo 11 – landed on the Moon in 1969





CLEMENTINE SPACECRAFT

1994 sent to survey the Moon's surface

Collected data on the mineral content of Moon rocks

Mapped features on the Moon's surface

Impact basins, or craters, are depressions left by objects striking the Moon.

Identified South Pole –Aitken Basin as possible location for a moon colony.

PATTERNS YOU EXPECT TO SEE WITH THE EARTH, MOON, AND SUN

Seasons

The Earth's tilted at 23.5 is what gives us the seasons. We are further from the Sun in the Summer, but tilted towards the Sun. That gives us more solar radiation (sunlight)

Earth revolves around the Sun – gives us our calendar year - 365 days

Earth's rotation gives us day and night. The Earth rotates on its own axis counter clockwise once every 24 hours.

The Moon revolves around Earth and gives us moon phases and tides. It takes 27 days to rotate on its axis and to orbit Earth. This is why we always see the same side of the Moon.

Eclipses – both Solar and Lunar – Earth, Moon and Sun are in a certain pattern – they are following a pattern.