

## MOON NOTES

Like the Sun, the Moon rises in the eastern part of the sky and sets in the west.

The Moon appears to arc across the sky at a rate of 15 degrees per hour due to the Earth's rotation

The Moon revolves around the Earth

As a result of the Moon's revolution around the Earth, the Moon is NOT in the same spot each day at the same time.

The Moon shifts its position 13 degrees per day to the east compared to where it was viewed 24 hours before

This means that the moon rises later each successive day by approximately 50 minutes, sometimes rising in the morning, sometimes in the afternoon, and sometimes at night.

Similarly, the moon sets later each day, and can set at any time of the day or night, depending on where it is with respect to the sun.

Half of the Moon is always lit up by the Sun, but from Earth we do not always see the entire lit surface.

Due to the Moon's revolution around the Earth, it goes through its cycle of phases. When we cannot see the lit surface of the Moon at all from Earth it is a New Moon. When we can see the complete lit surface it is a Full Moon. When we see half of the lit surface it is a Quarter Moon (first quarter is when we see the right side lit up and third quarter is when we see the left side lit up.)

Waxing means that the Moon is appearing to become more and more lit up each day. This means it is approaching the Full Moon phase.

Waning means that the Moon is appearing to become less and less lit up each day. This means it is approaching the New Moon phase.

The Moon's period of rotation equals its period of revolution (27.3 days.) Therefore the moon rotates as fast as it revolves. This causes us to only see one side of the Moon from Earth.

Because the Moon is revolving around the Earth, it is not always at the same place at the same time each day. The Earth's rotation has to "catch up" with the Moon's movement each day--and it takes about 52 minutes to do so. So it takes almost another hour for you to see the Moon in the same place as you saw it the previous day.

It takes 29.5 days to complete a full cycle of Moon phases. However, it takes 27.3 days for the Moon to make a complete revolution. Why the difference?

Every 27.3 days, the Moon will make one complete revolution around the Earth compared to a distant star.

However, every 27.3 days, the Moon will NOT be lined up properly to begin the lunar cycle again. The reason for this is that the Moon and Earth have moved, and are not lined up the way they were to start. It takes another 2 days to do this.

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The tides are primarily due to the gravitational attraction of the Moon.

When a location on Earth is rotated towards the Moon, tides are highest as the gravitational pull on the waters of earth are greatest. There are also high tides on the opposite side of the earth because the earth is pulling "away" from the waters there.

Since water is pulled towards the areas facing the Moon and opposite the Moon, the areas in between experience the low tides (water is drawn from here)

Therefore, locations on earth generally experience two high tides and two low tides a day.

The Sun also exerts a gravitational pull on the waters of the Earth.

When the Sun is lined up with the Moon, such as at FULL and NEW Moon, the combined gravitational pull creates the highest high tides and lowest low tides (greatest difference between high and low tides.) These are called "Spring" tides (does not have to do with the season--but rather derived from "spring or leap forward")

When the Sun and Moon are at right angles to each other, such as at 1st Quarter and 3rd Quarter, the gravitational pull of the two objects work against each other. Therefore high tides are not that high, and low tides are not that low. This creates the smallest difference between high and low tide.

A solar eclipse is caused when the Moon's shadow is cast on Earth, blocking out the Sun.

Solar eclipses only occur during the New Moon phase.

A solar eclipse does not happen every New Moon because the Moon's orbit is tilted 5 degrees from the Earth's orbit. So the Moon's shadow is often cast into space

Since the Moon has an elliptical (eccentric) orbit, its shadow sometimes does not block out the entire view of the Sun (shadow is smaller in diameter.) Then you can see the outer edge of the Sun. This is called an annular eclipse.

During a solar eclipse, the Sun's corona (outer atmosphere) is visible to our (protected) eyes.

The Moon's shadow only covers a width of 100 miles, so the eclipse is viewed in only a small part of the planet.

Solar eclipses happen 2-5 times a year.

A lunar eclipse occurs when the Earth's shadow is cast on the Moon, covering it.

A lunar eclipse can only happen during the Full Moon phase, but does not happen every Full Moon due to the Moon's orbit being angled 5 degrees to the Earth's orbit.

A Lunar eclipse is visible anywhere on the Earth's nighttime side.

A Lunar eclipse looks red or copper colored due to the fact that the longer red wavelengths can still get around the Earth and onto the Moon.