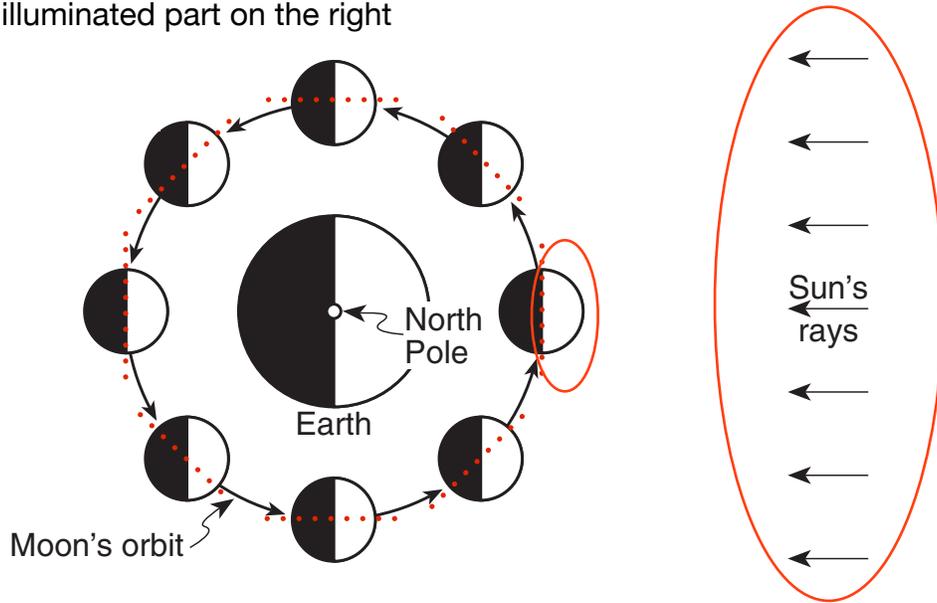


THE MOON PHASES

We only see the part of the moon that is illuminated by the Sun.

In the diagram below we see that the sun is on the right, and every moon position shows the illuminated part on the right

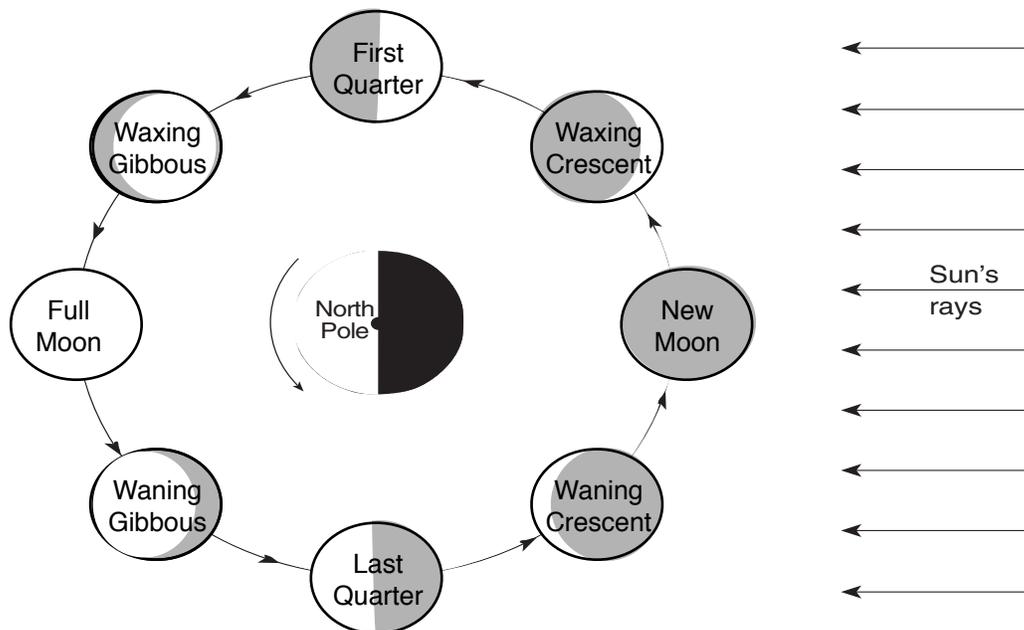


As the moon revolves around the Earth, we see different amounts of that illuminated moon

Sometimes none of the lit part faces the Earth (New moon)
and other times all of the lit part faces the Earth (Full moon)

The Moon moves **counterclockwise**. As the moon moves around (from New to Full) we see more and more (the moon is waxing) and then as it continues (from Full back to New) we see less and less (the moon is waning). The diagram below shows the phase of the moon in white.

Waxing = illuminated on the right
Waning = illuminated on the left



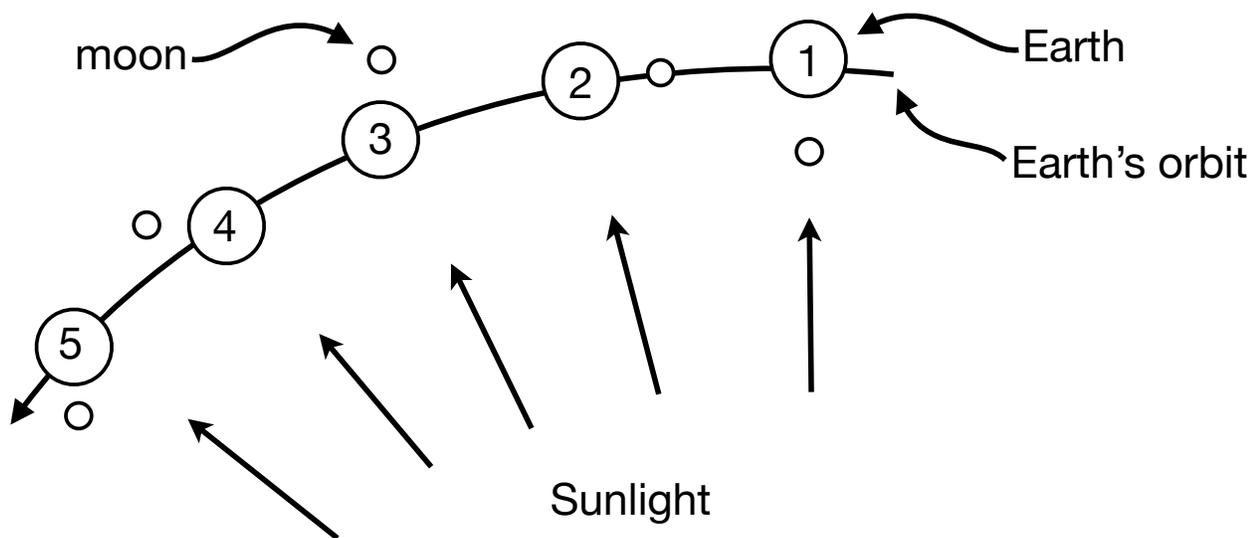
Moon Phases

The moon's revolution around the Earth takes **27.3 days**

The cycle of phases takes **29.5 days**
(how long it takes for us to see all of the phases of the moon)

The cycle of phases is longer than the Moon's period of revolution because the Earth is revolving around the sun

Below is a diagram showing the moon revolving around the Earth, as the Earth revolves around the Sun



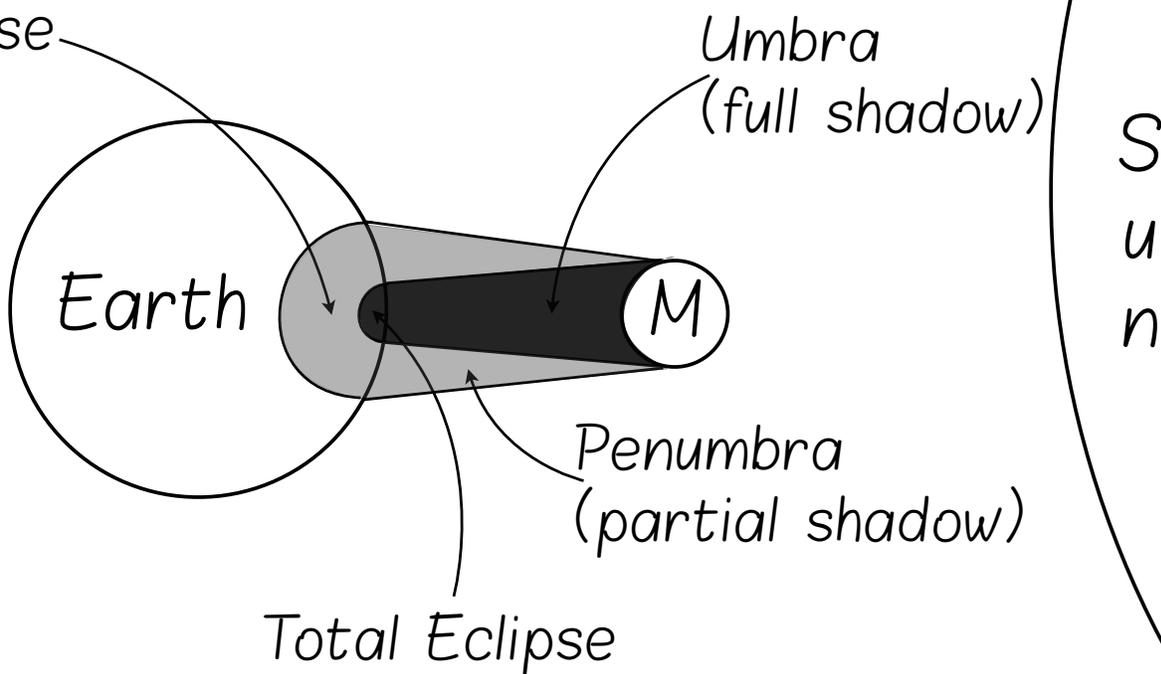
Notice in position 1, the moon is directly between the Earth and the Sun

But by position 5, even though the moon is directly below the Earth again, it is no longer between the Earth and Sun. The Moon must travel 2.2 more days to be exactly between the Earth and Sun (new moon)

Solar Eclipse

- Sun is blocked by the Moon (Moon's shadow falls on Earth)
- Can only occur in new moon phase

Partial Eclipse

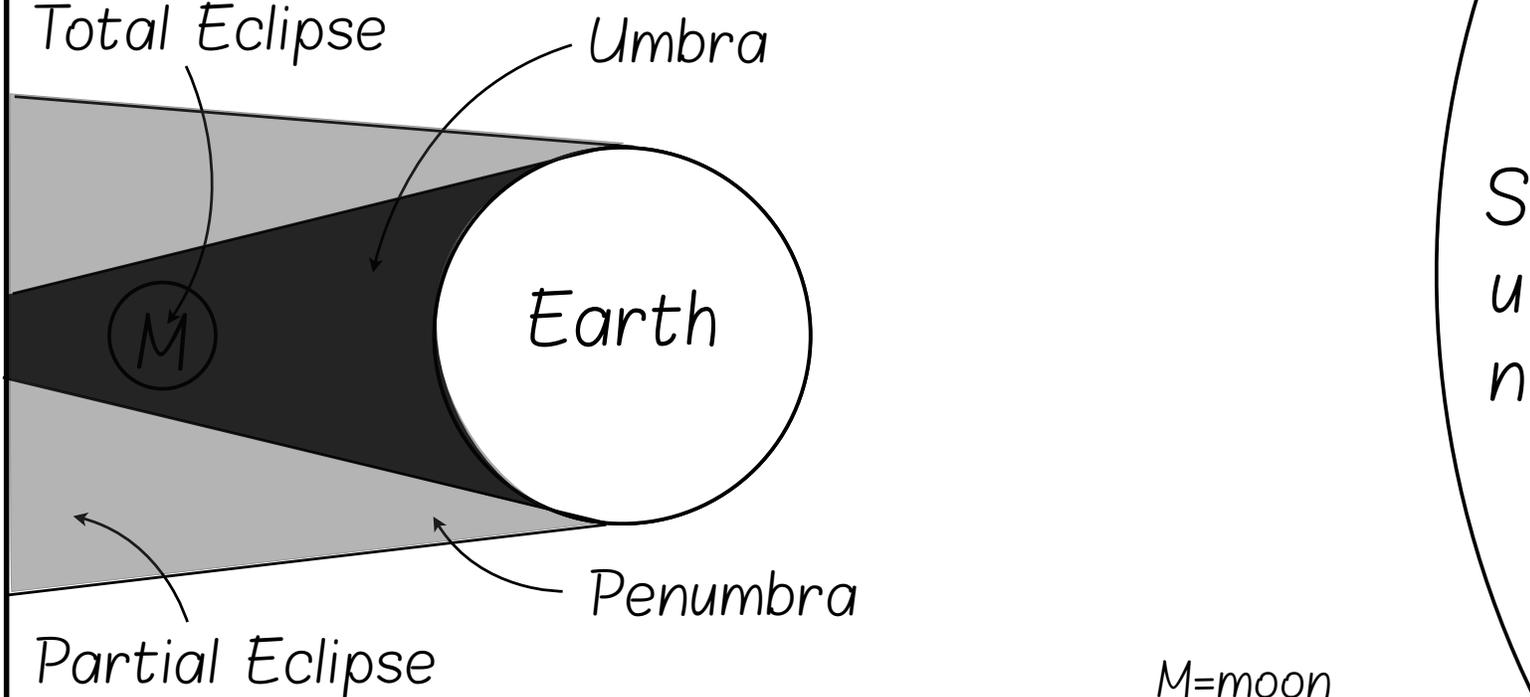


M=moon

Lunar Eclipse

- Moon is blocked by Earth's shadow (Earth's shadow falls on Moon)
- Can only occur in full moon phase

Total Eclipse



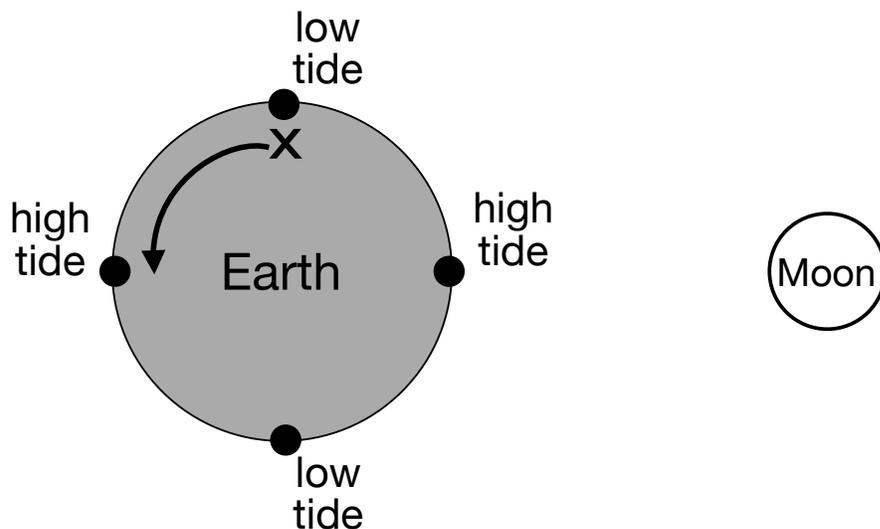
M=moon

Tides

Gravity between the moon and Earth causes a cyclic rise and fall in ocean waters

Locations in line with the moon have the strongest pull and the highest tides

As the Earth rotates, a location (labeled x) will experience high and low tides.

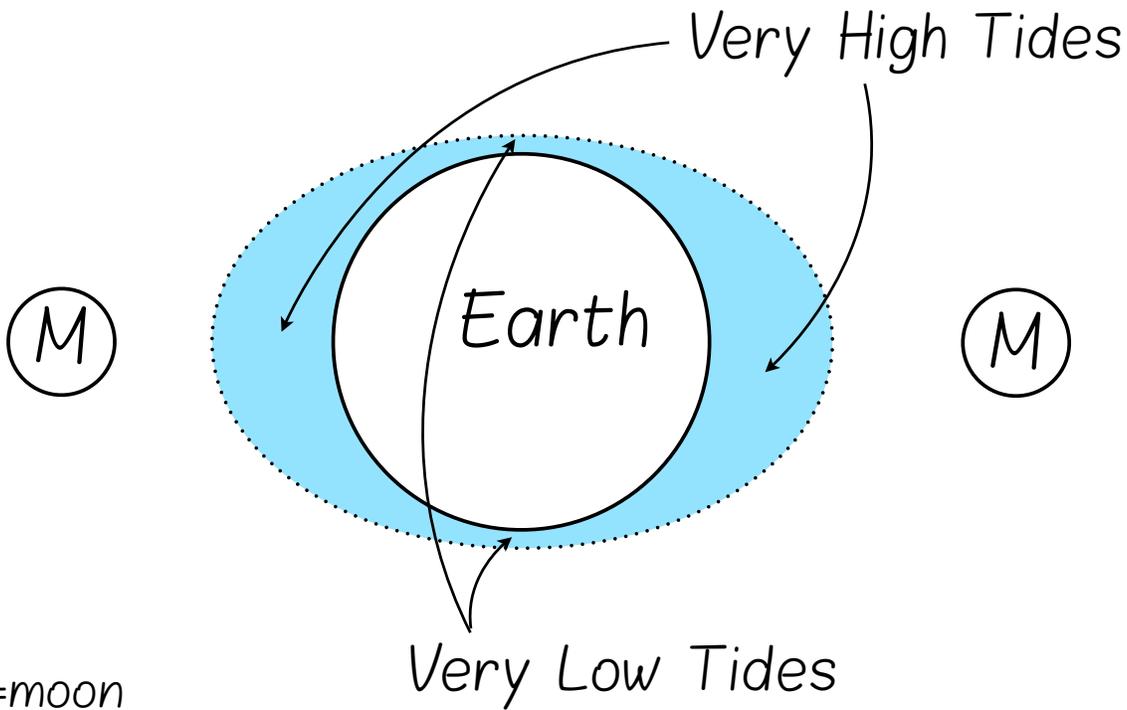


Tides occur because the moon's gravity pulls the water closest to it

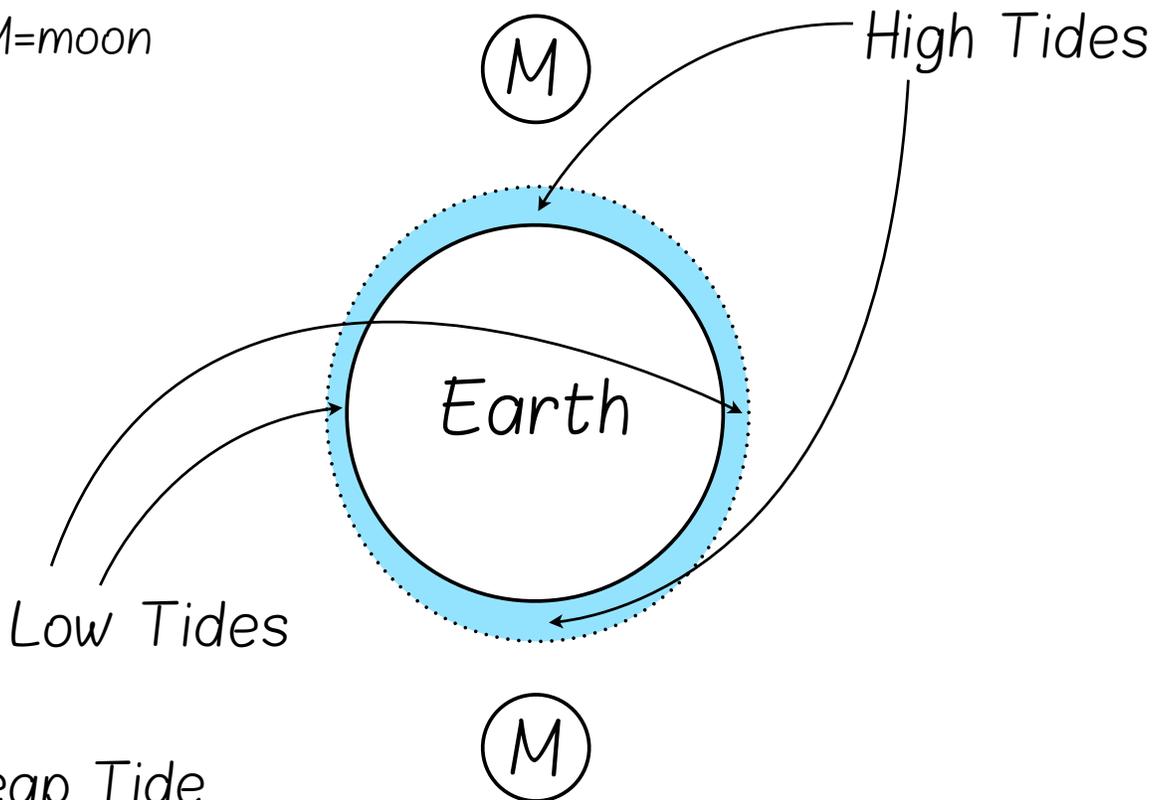
- 4 Tides in 24 hours
- Each day there are two high tides and two low tides
- 6 hours between high tide and low tide
- 12 hours between high tide and the next high tide

Spring Tide

- Very High and Very Low Tides
- Can occur in new moon and full moon phases



M=moon



Neap Tide

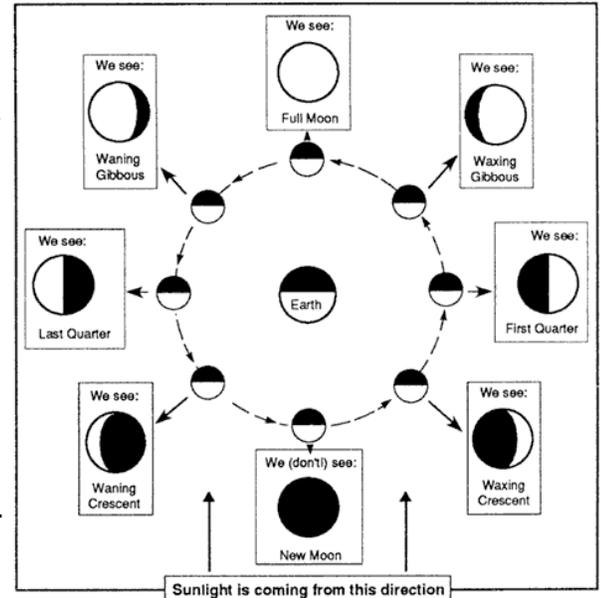
- High and Low Tides are less extreme
- Can occur in 1st quarter moon and 3rd quarter moon phases

THE MOON

- ▶ The Moon revolves around the Earth once every 27.3 days.
- ▶ The Moon also rotates on its axis once every 27.3 days.
 - ▶ Because these periods are the same, we only ever see one side of the Moon from Earth.
- ▶ The Moon appears to rise 50 minutes later each night.

Lunar Phases

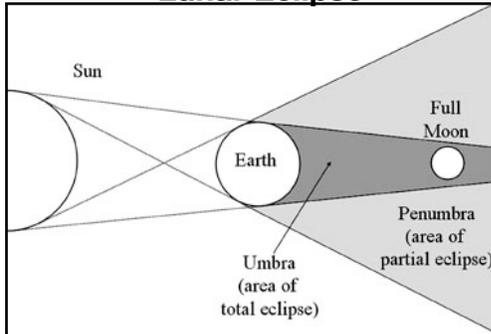
- ▶ Only the side of the Moon facing the Sun is illuminated...the other side is dark.
- ▶ When the Moon revolves around the Earth, we see varying amounts of this illuminated side...this is why we see the phases of the Moon.
 - ▶ Waxing means the illuminated portion is getting bigger each night.
 - ▶ Waning means the illuminated portion is getting smaller each night.



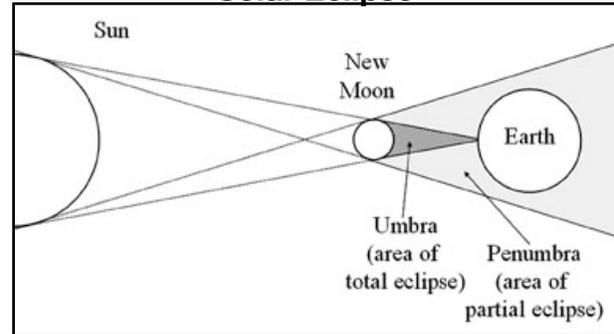
Eclipses

- ▶ A lunar eclipse occurs when the Earth passes between the Sun and the Moon causing the Moon to be blocked out by the shadow of the Earth.
 - ▶ Lunar eclipses only occur during the Full Moon phase.
- ▶ A solar eclipse occurs when the Moon passes directly between the Sun and Earth causing the Sun to be blocked out by the Moon.
 - ▶ Solar eclipses only occur during the New Moon phase.
- ▶ Eclipses don't occur every month because the Moon's orbit is slightly tilted relative to the Earth's path around the Sun. This causes the Moon to be either above or below the Earth most months.

Lunar Eclipse



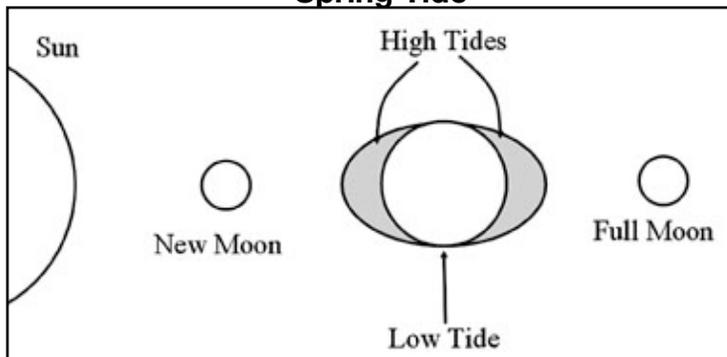
Solar Eclipse



Tides

- ▶ Tides occur because of the gravitational pull of the Moon and Sun.
- ▶ There are two high and two low tides each day.
- ▶ Spring Tides occur when the Earth, Sun, and Moon are lined up causing higher than normal tides.
 - ▶ Spring tides occur only in the New and Full Moon phases.
- ▶ Neap Tides occur when the Moon acts on its own causing less severe high tides.
 - ▶ Neap tides occur only in the First and Last Quarter phases.
- ▶ Tides are cyclic and predictable.

Spring Tide



Neap Tide

