Moon Phases & Tides Notes

Lunar Movement

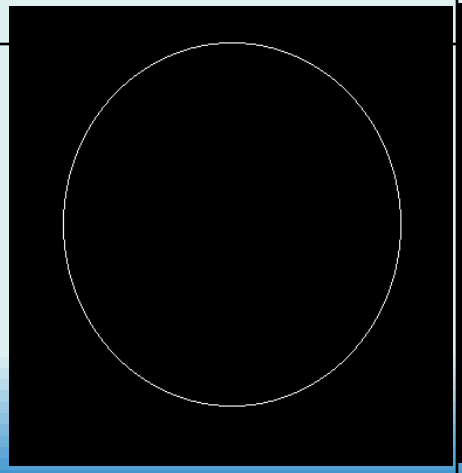
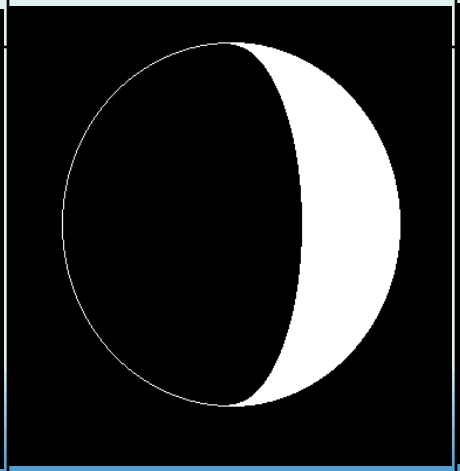
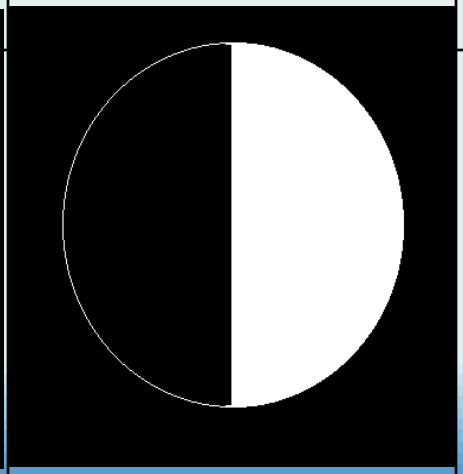
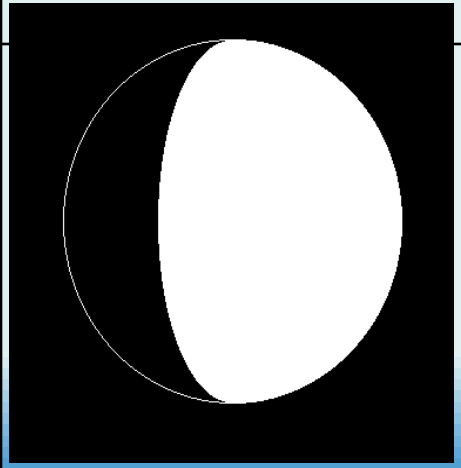
- Revolves around Earth as the Earth revolves around the Sun.
- Revolves around Earth in 29 ½ Earth days.
- Rotates on its axis in a little over 27 Earth days.
  - The same side of the Moon always faces Earth because it rotates at about the same rate as Earth.
- The moon is approximately 239,000 miles away from Earth's surface.

Phases of the Moon

- As the position of the Moon changes as it revolves around Earth, we observe different moon phases.
- The cause of moon phases depends on how much of the sunlit side of the Moon faces Earth.
- 8 Phases include:
  - new moon, waxing crescent, 1st quarter, waxing gibbous, full moon, waning gibbous, 3rd quarter, and waning crescent

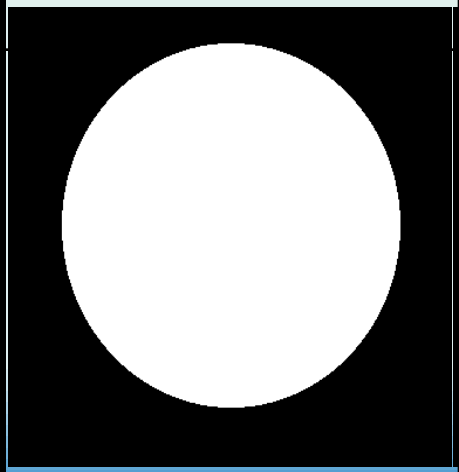
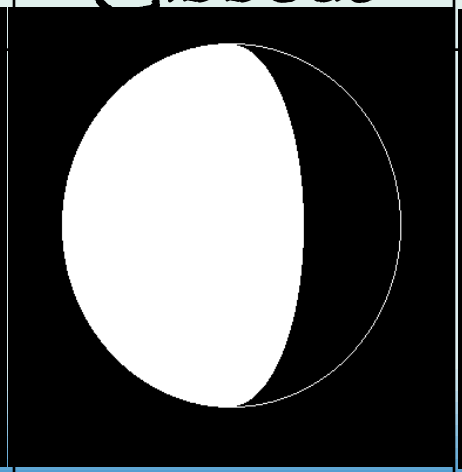
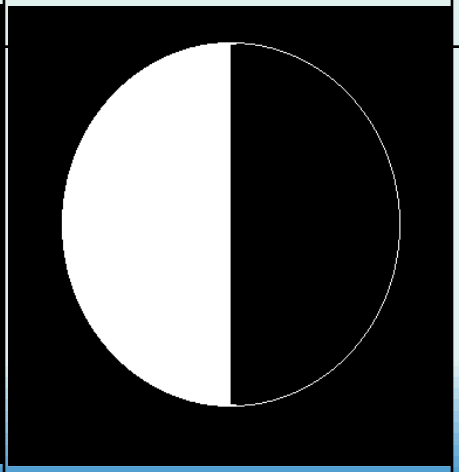
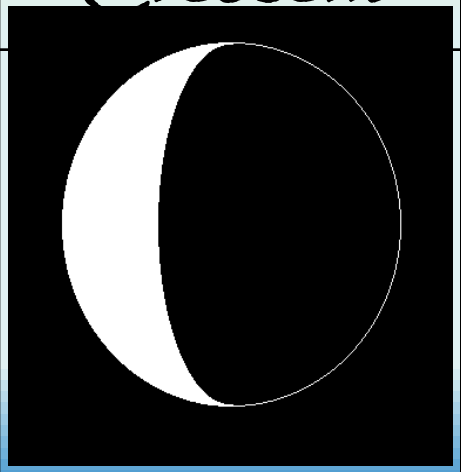
Waxing

- Waxing: the amount of the sunlit side we see increases.
  - The sunlit side is white on the right side.
- The sunlit side increases from New Moon to Full Moon.

New Moon	Waxing Crescent	1st Quarter	Waxing Gibbous
			

Waning

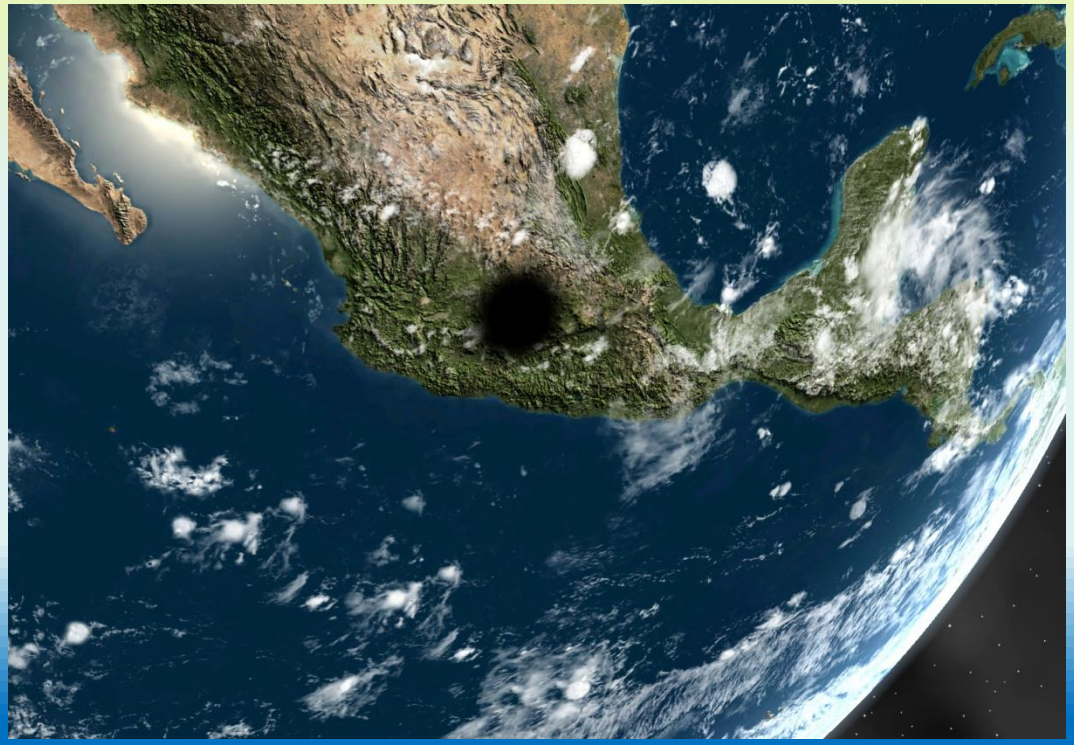
- Waning: the amount of the sunlit side we see decreases.
  - The sunlit side is white on the left side.
- The sunlit side decreases from Full Moon to New Moon.

Full Moon	Waning Gibbous	3rd Quarter	Waning Crescent
			


FULL WOLF MOON
THE OLD FARMER'S ALMANAC
FULL SNOW MOON
THE OLD FARMER'S ALMANAC
FULL WORM MOON
THE OLD FARMER'S ALMANAC
FULL PINK MOON
THE OLD FARMER'S ALMANAC
FULL FLOWER MOON
THE OLD FARMER'S ALMANAC
FULL STRAWBERRY MOON
THE OLD FARMER'S ALMANAC
FULL BUCK MOON
THE OLD FARMER'S ALMANAC
FULL STURGEON MOON
THE OLD FARMER'S ALMANAC
FULL CORN MOON
THE OLD FARMER'S ALMANAC
FULL HUNTER MOON
THE OLD FARMER'S ALMANAC
FULL BEAVER MOON
THE OLD FARMER'S ALMANAC
FULL COLD MOON
THE OLD FARMER'S ALMANAC

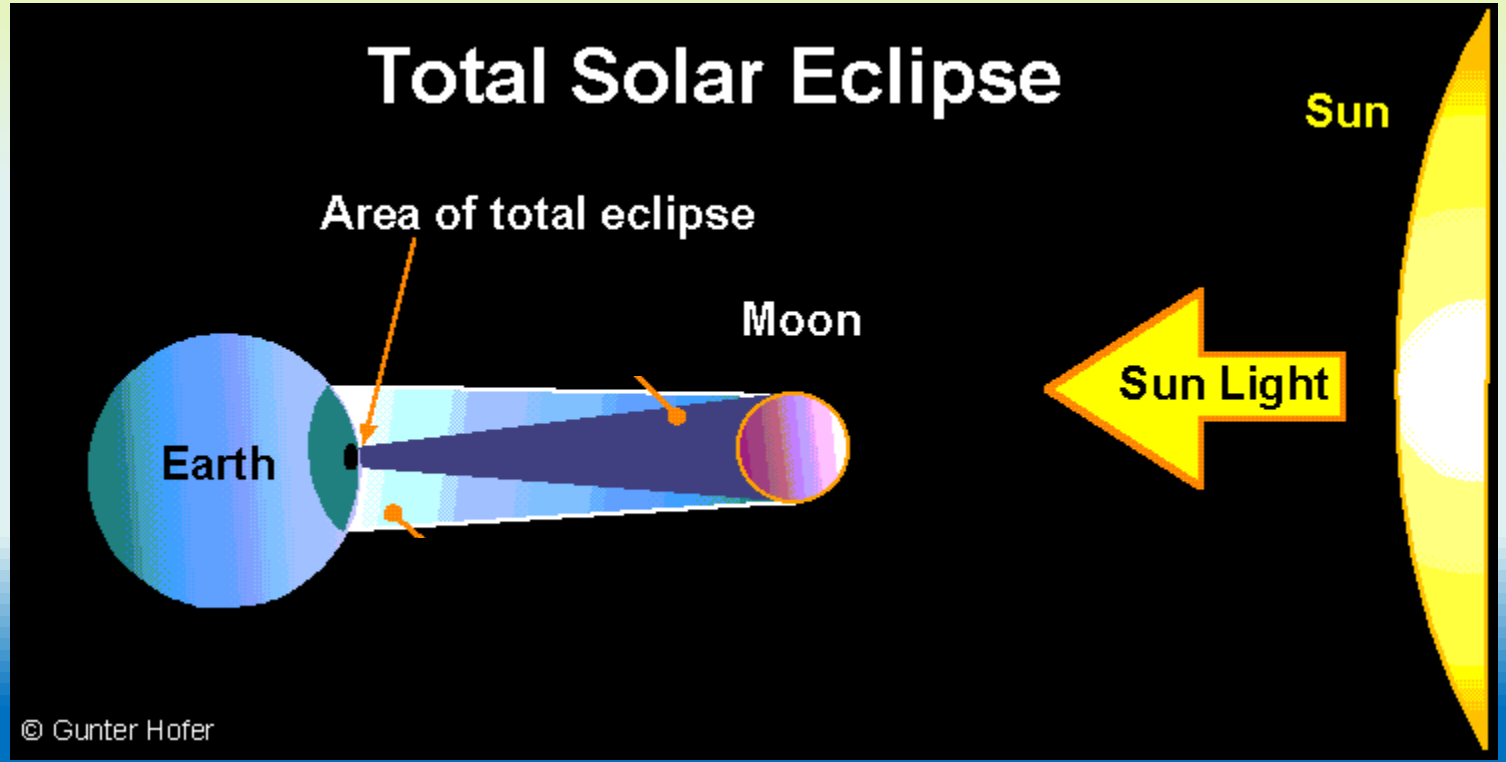
Eclipses

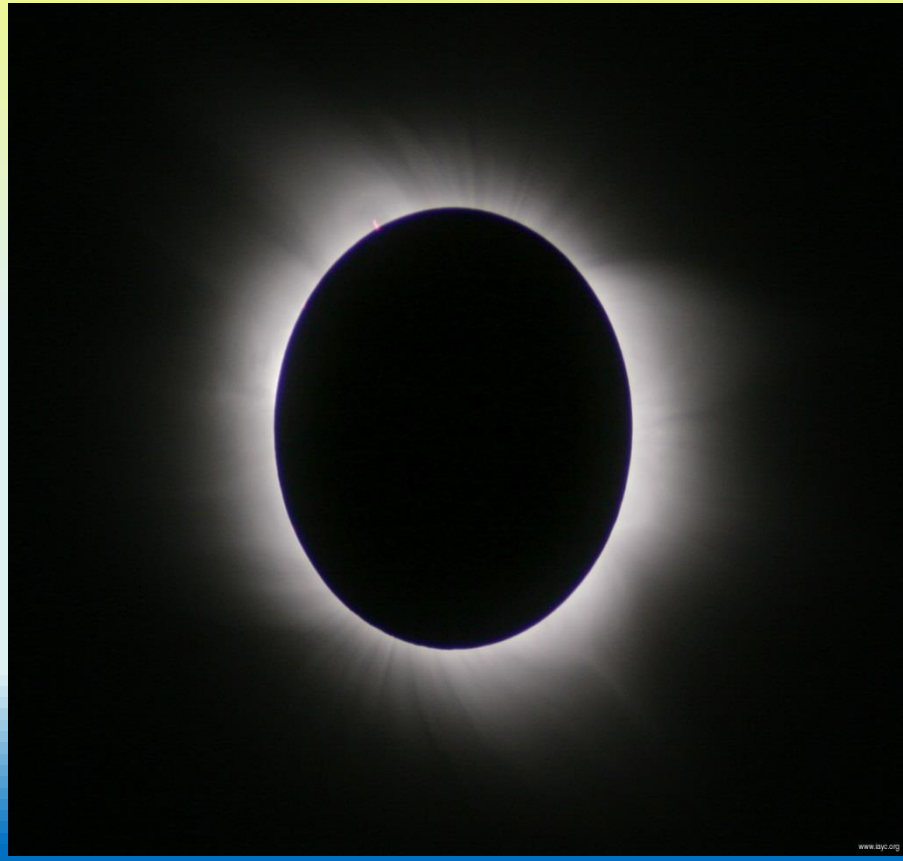
- are a result of an alignment of Earth, Sun, and Moon
- two types – solar and lunar



Solar Eclipse

- occurs when the Moon is directly in-between the Sun and Earth, blocking the Sun's light casting a shadow over a certain area on Earth
- Occurs during a New Moon phase

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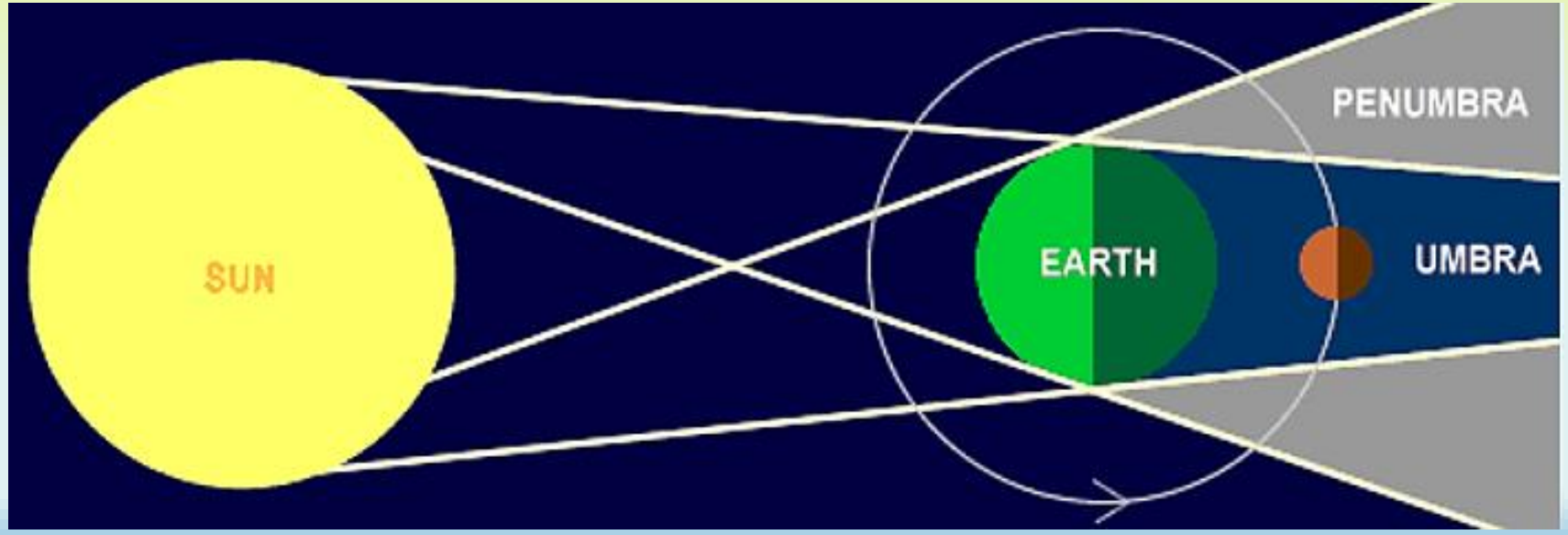
Lunar Eclipse

- occurs when Earth is directly in-between the Sun and the Moon, blocking the Sun 's light so that Earth ' s shadow hits the Moon casting a shadow over the Moon
- Occurs during the Full Moon



Lunar Eclipses

Spring Tides

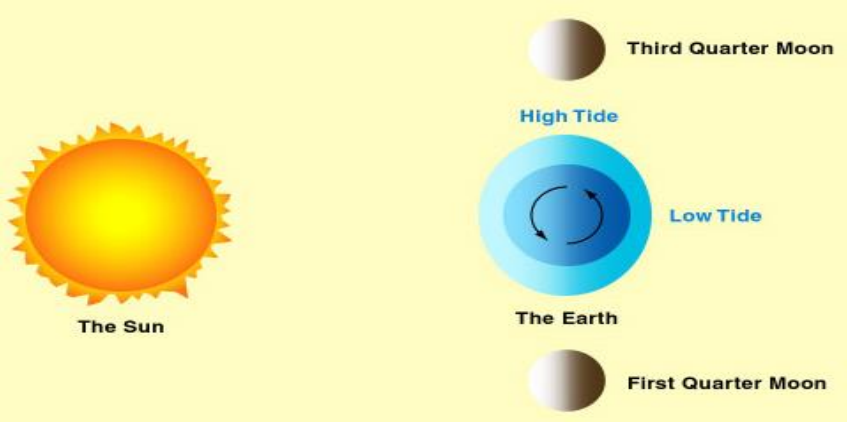
When the Sun and the Moon are aligned the high tides are higher and the low tides are lower

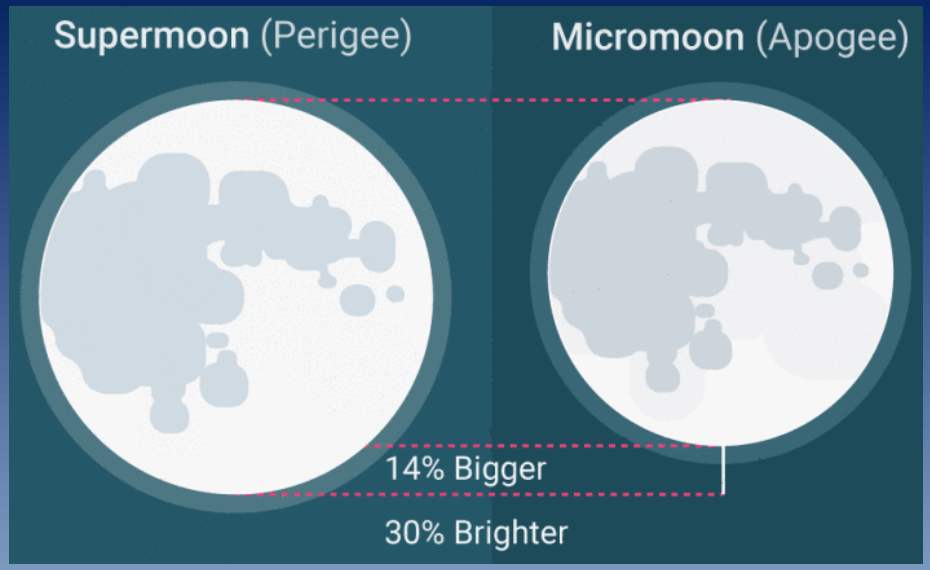
(Tip: Spring = straight line=significant difference)

Neap Tides

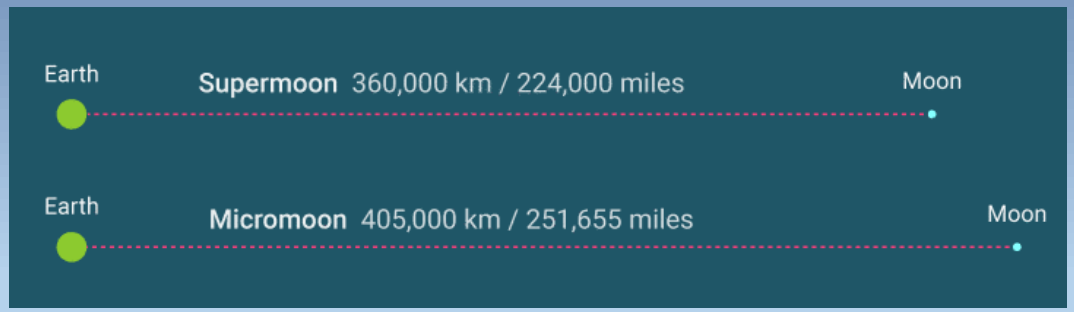
When the Sun and the Moon are at right angles (90°) to each other; the high and low tides have the least difference in the tidal range at the shore

(Tip: Neap =Ninety° angle = Not a lot of difference)





The **greatest difference between high and low tide** is around **Full Moon** and **New Moon**, known as spring tides or king tides. During these Moon phases, the **gravitational forces of the Moon and the Sun combine** to pull the ocean's water in the same direction.



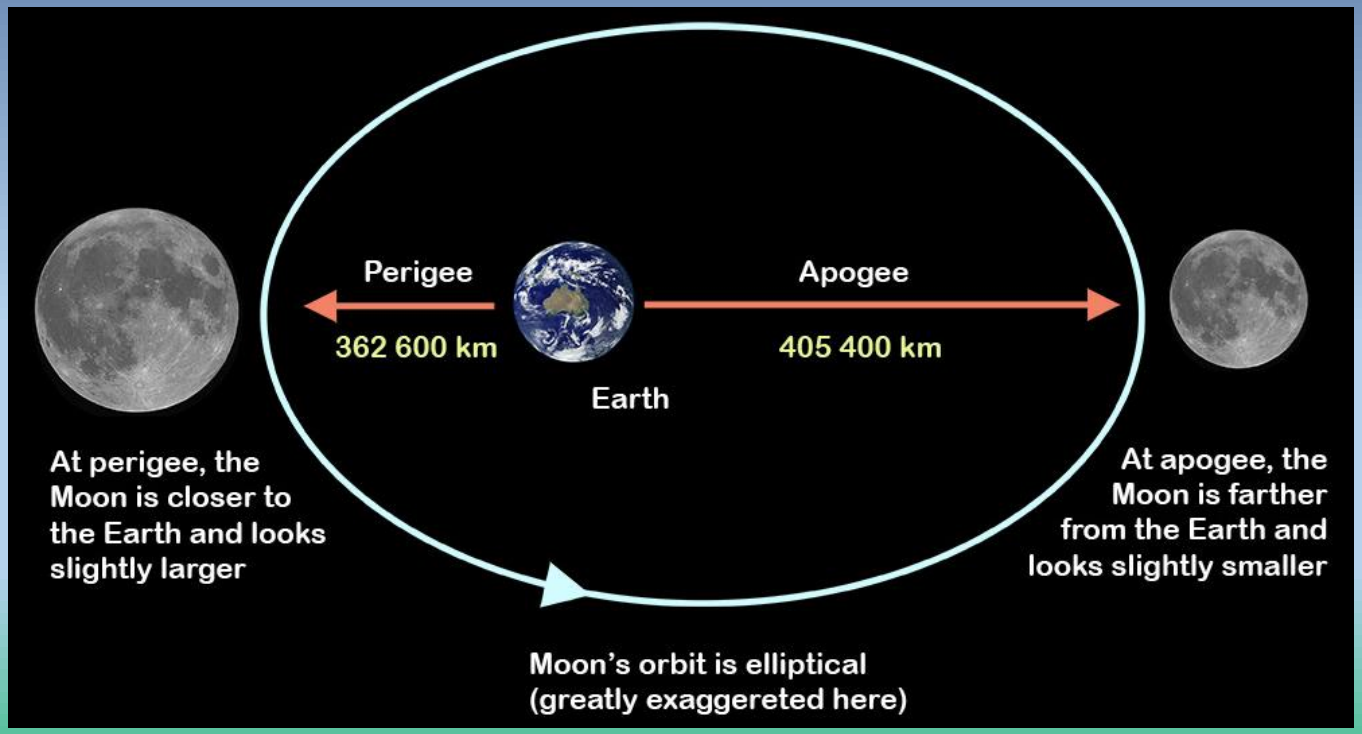
Perigean spring tides have around 5 cm (2 inches) **larger variation** than regular spring tides
Apogean spring tides have around 5 cm (2 inches) **smaller variation** than normal spring tides.

Perigees and Apogees

Perigee (Moon Closest to Earth)				Apogee (Moon Fartest from Earth			
Jan 21 19:59	357344 km		F+ 14h	Jan 9 4:30	406114 km	-	N+3d 3h
Feb 19 9:07	356761 km	++	F- 6h	Feb 5 9:28	406555 km	--	N+ 12h
Mar 19 19:48	359380 km		F-1d 5h	Mar 4 11:27	406390 km	-	N-2d 4h
Apr 16 22:03	364208 km		F-2d13h	Apr 1 0:15	405576 km		N-4d 8h
May 13 21:54	369015 km		F-4d23h	Apr 28 18:21	404576 km		N-6d 4h
Jun 7 23:23	368506 km		N+4d13h	May 26 13:28	404133 km		F+7d16h
Jul 5 4:56	363727 km		N+2d 9h	Jun 23 7:52	404548 km		F+5d23h
Aug 2 7:10	359397 km		N+1d 3h	Jul 21 0:02	405478 km		F+4d 2h
Aug 30 15:59	357175 km	-	N+ 5h	Aug 17 10:51	406243 km	+	F+1d22h
Sep 28 2:28	357802 km		N- 15h	Sep 13 13:33	406377 km	+	F- 15h
Oct 26 10:42	361314 km		N-1d16h	Oct 10 18:30	405901 km		F-3d 2h
Nov 23 7:56	366720 km		N-3d 7h	Nov 7 8:38	405059 km		F-5d 4h
Dec 18 20:31	370258 km		F+6d15h	Dec 5 4:10	404445 km		F-7d 1h

New and Full Moons

New Moon	Full Moon
	2018 Dec 22 17:50
2019 Jan 6 1:30	2019 Jan 21 5:17
2019 Feb 4 21:05	2019 Feb 19 15:54
2019 Mar 6 16:05	2019 Mar 21 1:43
2019 Apr 5 8:52	2019 Apr 19 11:12
2019 May 4 22:47	2019 May 18 21:12
2019 Jun 3 10:03	2019 Jun 17 8:31
2019 Jul 2 19:17	2019 Jul 16 21:40
2019 Aug 1 3:13	2019 Aug 15 12:31
2019 Aug 30 10:38	2019 Sep 14 4:35
2019 Sep 28 18:28	2019 Oct 13 21:11
2019 Oct 28 3:40	2019 Nov 12 13:37
2019 Nov 26 15:08	2019 Dec 12 5:15
2019 Dec 26 5:16	2020 Jan 10 19:23



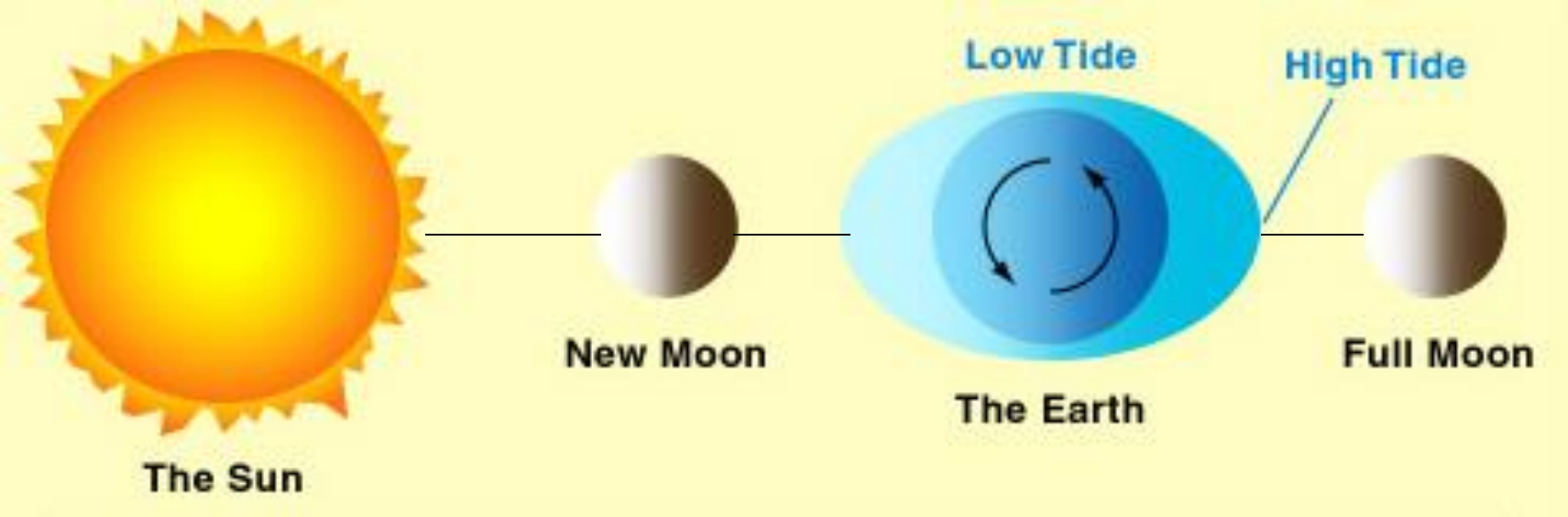
Apogee	Perigee
Jan 09	Jan 21
Feb 05	Feb 19
Mar 04	Mar 19
Apr 01	Apr 16
Apr 28	May 13
May 26	June 07
June 23	July 05
July 20	Aug 02
Aug 17	Aug 30
Sept 13	Sept 28
Oct 10	Oct 26
Nov 07	Nov 23
Dec 05	Dec 18

Tides

- Changes in the surface levels of Earth's ocean water caused by the effects of the Moon 's and Sun 's gravity on Earth.
- Effects are most noticeable along ocean shorelines.
- As the Moon orbits Earth, the waters of Earth closest to the Moon bulge outward toward the Moon; this bulge is the ***high tide***. Another high tide occurs on the opposite side of Earth.
- ***Low tides*** occur in the areas between the two high tides.

Spring Tides

- When the Sun and the Moon are aligned the high tides are higher and the low tides are lower (Tip: Spring = straight line=significant difference)



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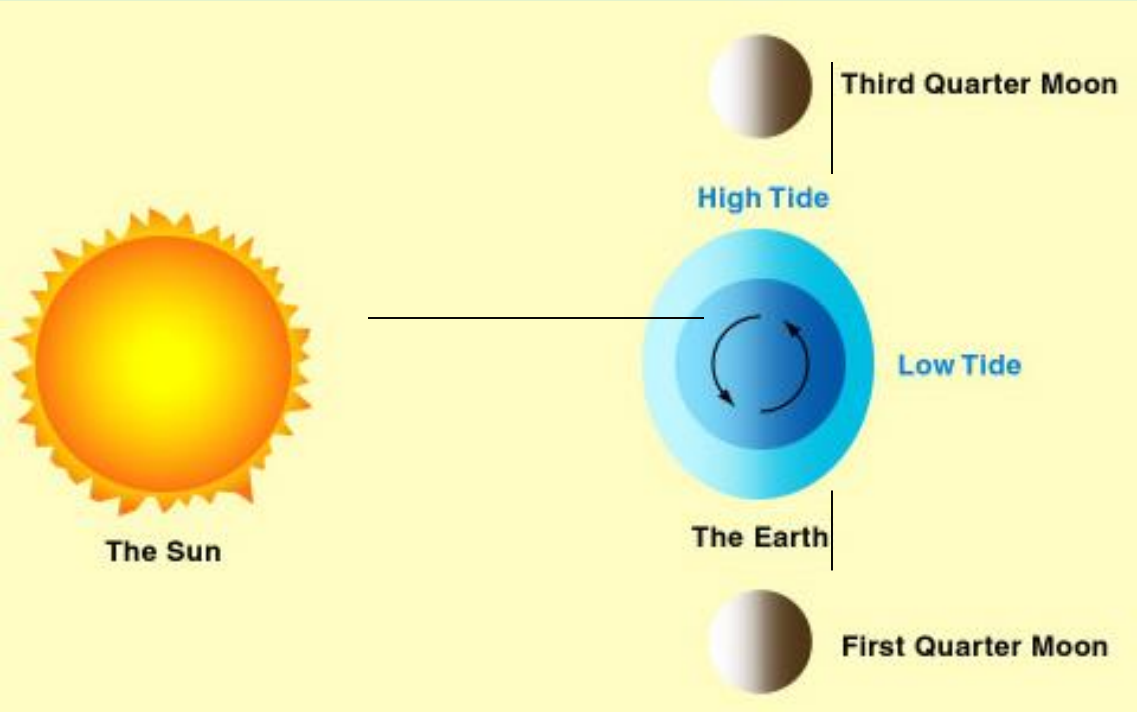

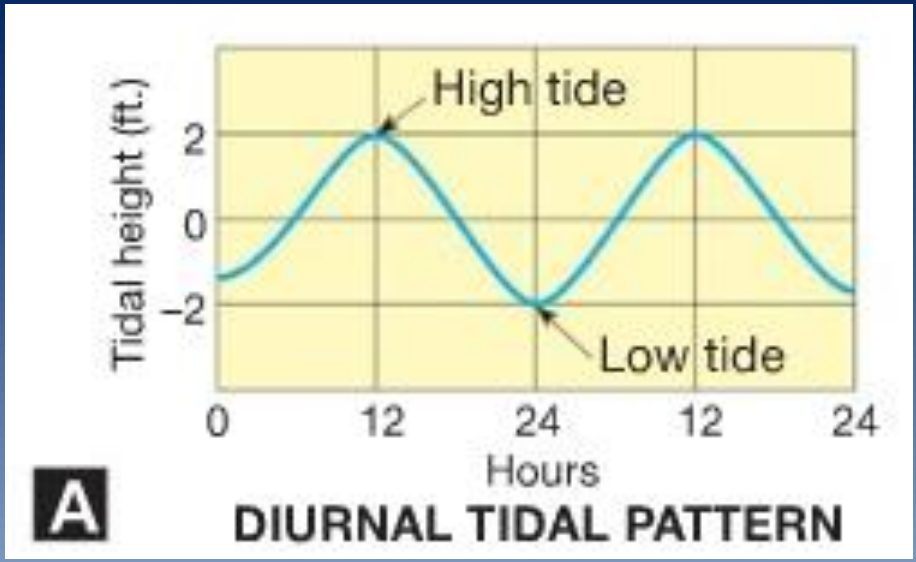

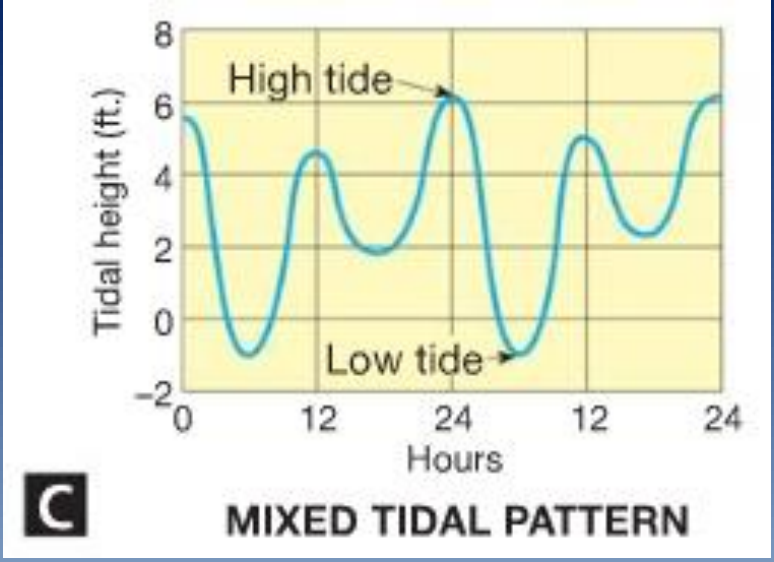

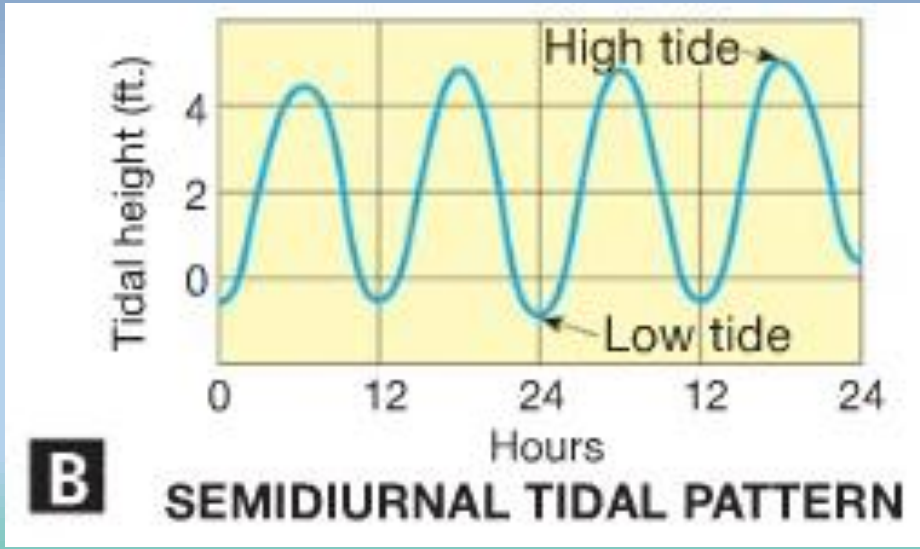

(A) 1 high/1 low per day
Northern shore of the Gulf of Mexico

(B) 2 high/2 low per day, each high is about the same height, as is the 2 low tides. Atlantic Coast of the U.S.

(C) "Usually" 2 high/2 low per day. Inequality between the high tides to one another, same with low tides. Pacific Coast of the U.S. and other parts of the world.