

# TIDES

FACTS:

RESULT FROM THE GRAVITATIONAL PULL BETWEEN THE EARTH, SUN, AND MOON

GRAVITATIONAL ATTRACTION BETWEEN TWO BODIES IS:

- A. PROPORTIONAL TO THE PRODUCT OF THEIR MASSES
- B. INVERSELY PROPORTIONAL TO THE SQUARE OF THE DISTANCE BETWEEN THEM

## LAW OF GRAVITY

*EVERY PARTICLE IN THE UNIVERSE ATTRACTS EVERY OTHER PARTICLE WITH A FORCE THAT IS DIRECTLY PROPORTIONAL TO THE PRODUCT OF THEIR MASSES AND INVERSELY PROPORTIONAL TO THE SQUARE OF THE DISTANCE BETWEEN THEM.*

$$F = Gm_1m_2/R_2$$

G is a constant  $6.670 \times 10^{-11} \text{N-m}^2/\text{kg}^2$

- THE MOON IS CLOSER TO THE EARTH THAN THE SUN  
(EARTH/SUN)  
(1/400)
- THE SUN'S MASS IS 27,000,000 TIMES GREATER THAN THE MOON'S MASS
- LUNAR TIDE OCCURS EVERY 24 HOURS AND 50 MINUTES
- THE LUNAR MONTH IS 27.5 DAYS

TIDES ARE THE RESULT OF THE COMPLEX INTERACTION OF THE FOLLOWING:

1. MOVEMENT OF THE MOON IN RELATION TO THE EARTH'S EQUATOR
2. SUN AND MOON POSITION CHANGES IN RELATION TO THE EARTH
3. VARIATION OF WATER DISTRIBUTION OVER THE EARTH IRREGULARITY OF COASTLINES AND

## OCEAN BASINS

**HIGH TIDE** - HIGHEST WATER LEVEL

**LOW TIDE** - RETREAT TO THE LOWEST WATER LEVEL

**TIDAL RANGE** - VERTICAL DISTANCE BETWEEN HIGH AND LOW TIDE

**TIDAL PERIOD** - TIME BETWEEN SUCCESSIVE HIGH OR LOW TIDES  
(24 HOURS AND 50 MINUTES)

**ASTRONOMICAL TIDES** - RESPONSE TO MOVING SUN AND MOON  
\*THEORETICAL TIDES

**METEOROLOGICAL TIDES** - RESPONSE TO WIND AND WEATHER CONDITIONS  
\*ACTUAL TIDES

**DIURNAL TIDES** - ONE HIGH AND ONE LOW TIDE PER TIDAL DAY

**SEMIDIURNAL TIDES** - TWO HIGH AND TWO LOW TIDES OF SAME MAGNITUDES  
EACH TIDAL DAY

**MIXED TIDES** - TWO HIGH AND TWO LOW TIDES OF DIFFERENT MAGNITUDES  
PER TIDAL DAY

**SPRING TIDES** - TIMES OF HIGHEST AND LOWEST TIDES (EARTH, SUN, AND  
MOON IN A STRAIGHT LINE)  
\*NEW AND FULL MOONS

**NEAP TIDES** - TIME OF LOW HIGH TIDES AND HIGH LOW TIDES (SUN AND  
MOON AT RIGHT ANGLES TO THE EARTH)  
\*FIRST AND THIRD QUARTER MOONS

**APOGEE** - TIME WHEN THE MOON IS AT ITS GREATEST POINT FROM EARTH  
(LOWEST TIDES)

**PERIGEE** - TIME WHEN THE MOON IS AT ITS CLOSEST POINT TO THE EARTH  
(HIGHEST TIDES)  
\*THE VARIATION BETWEEN APOGEE  
AND PERIGEE IS ABOUT 30,000 MILES

**APHELION** - TIME WHEN THE SUN IS AT ITS GREATEST POINT FROM THE  
EARTH (LOWER TIDES) JULY FOURTH

**PERIHELION** - TIME WHEN SUN IS CLOSEST TO THE EARTH (HIGHER TIDES)  
JANUARY THIRD  
\*VARIATION IS ABOUT 3,500,000 MILES