

What do Tsunami, Seiches and Tides have in common?

1. they are waves
2. shallow water waves
3. are not wind driven waves

Tsunamis

- seismic (earthquake caused) sea waves

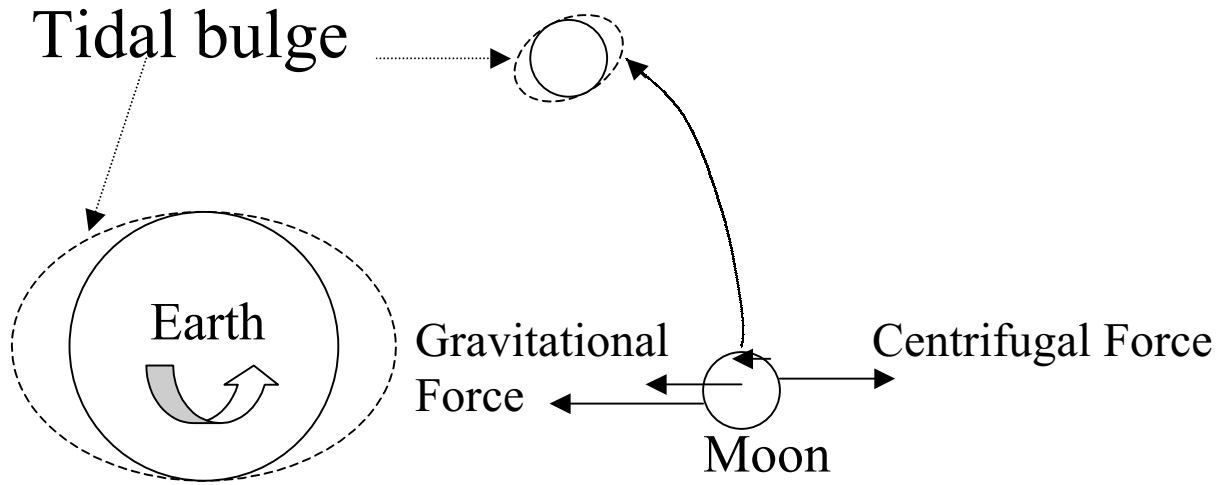
See Figure 11.5

Standing waves = Seiches (See Figure 11.3)

- do not progress
- progressive waves reflected back on themselves

What causes tides?

Gravity - the force that holds things together



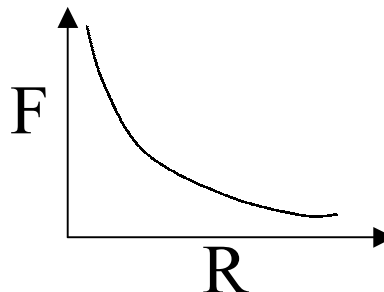
Egg shaped due to the gravity pull difference at the surface, center and opposite side

$$F = G \frac{m_{\text{Earth}} * m_{\text{Moon}}}{R^2}$$

m - mass
R - distance

Gradient in gravity

= difference in gravity with difference in distance



Equilibrium tidal theory

See Figures 11.17

11.19

11.22

The tidal day

The Earth turns eastward; 24 hour rotation

The Moon rotates about the Earth in 29.5 days

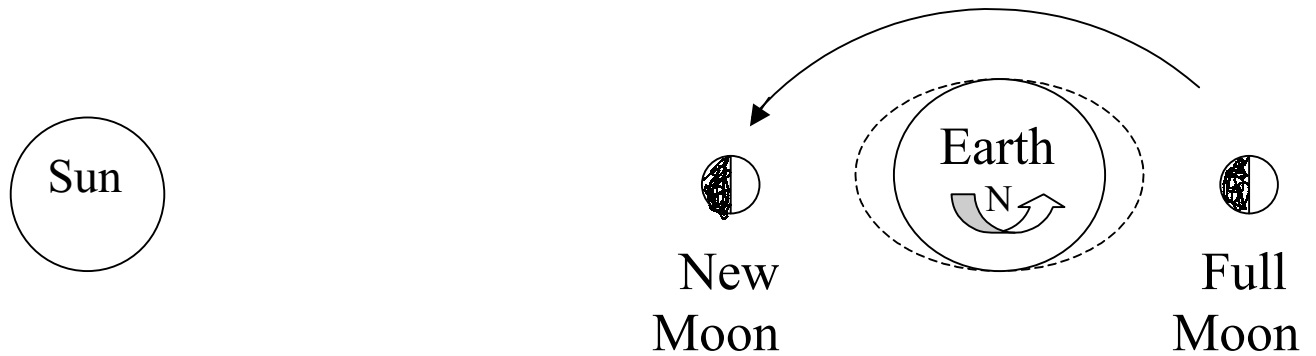


The Moon moves about 12° forward per day.

So, to bring the starting point on Earth in line with the Moon takes additional fifty minutes

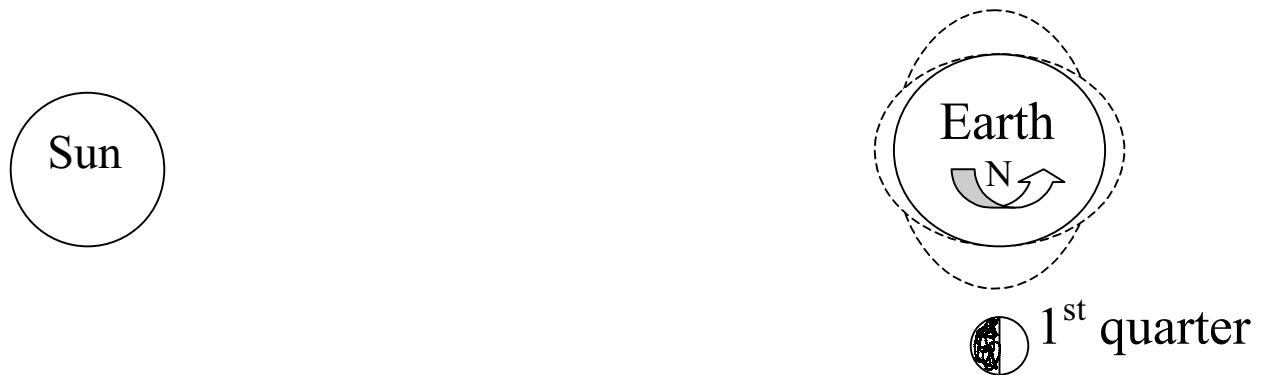
Thus, tidal day = 24 hours and 50 minutes

SPRING TIDE



Exceptionally high tides

NEAP TIDE



Low amplitude tides

The crests of the Moon tide coincide with the troughs of the Sun tide, so they cancel each other out.

See Figure 11.24

Tide levels

Water level increases → flood tide

Water level drops → ebb tide

Dynamic Tidal Analysis

Natural tide wave in natural ocean basins

- instead of bulge moving around the Earth being 6 feet high,
- tides move back and forth across the ocean basin
- they are shallow water waves (speed depend on ocean's depth)
- can oscillate as standing waves
- can be reflected, refracted and diffracted
- the Coriolis effect plays a role in the water's movement
- different kinds of tides interact with each other