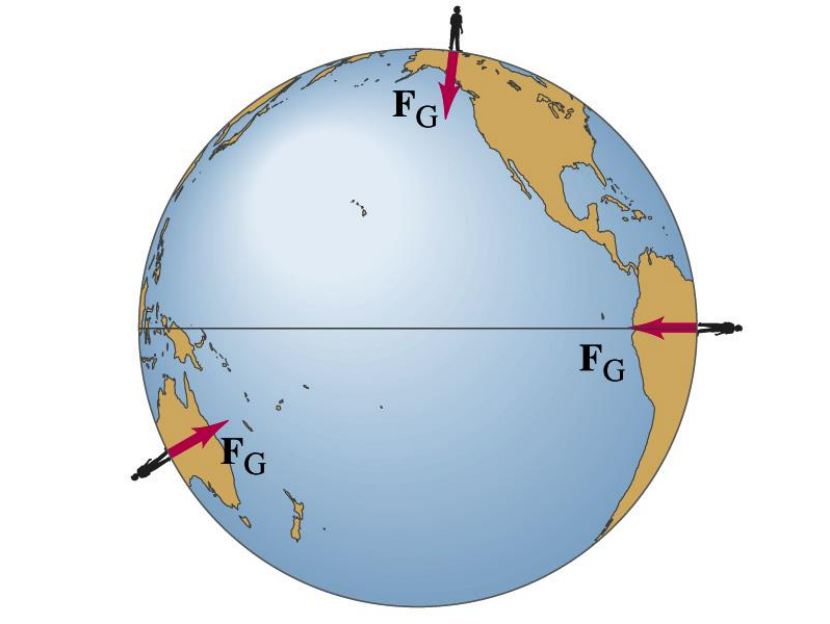
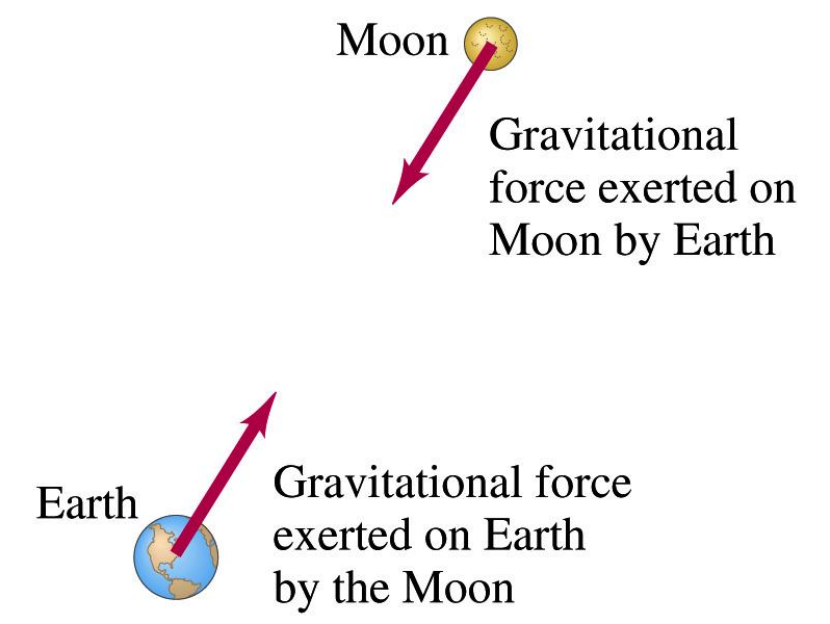
Gravitation

- Objects on earth get accelerated towards the center of the earth
- The Moon is on a circular trajectory

- Force between two objects ~ $1/r^2$
- Force ~ to mass of each object





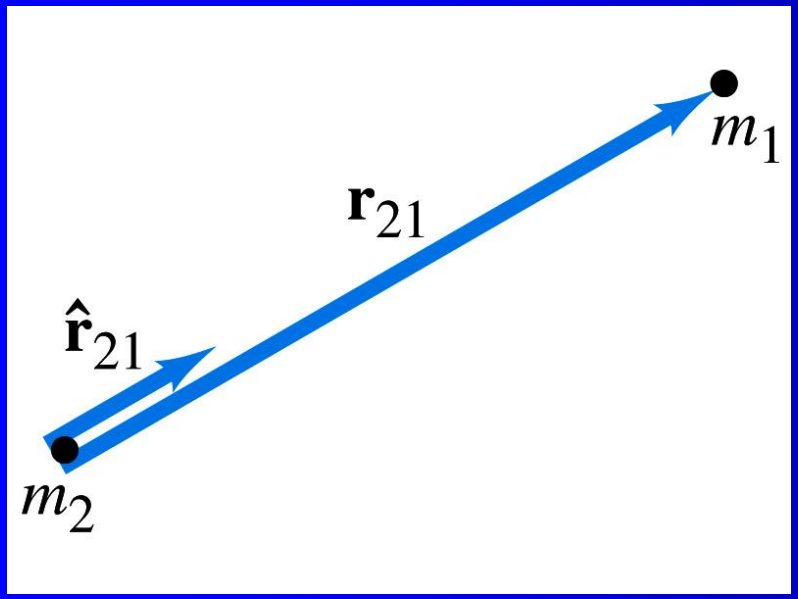
Gravitation

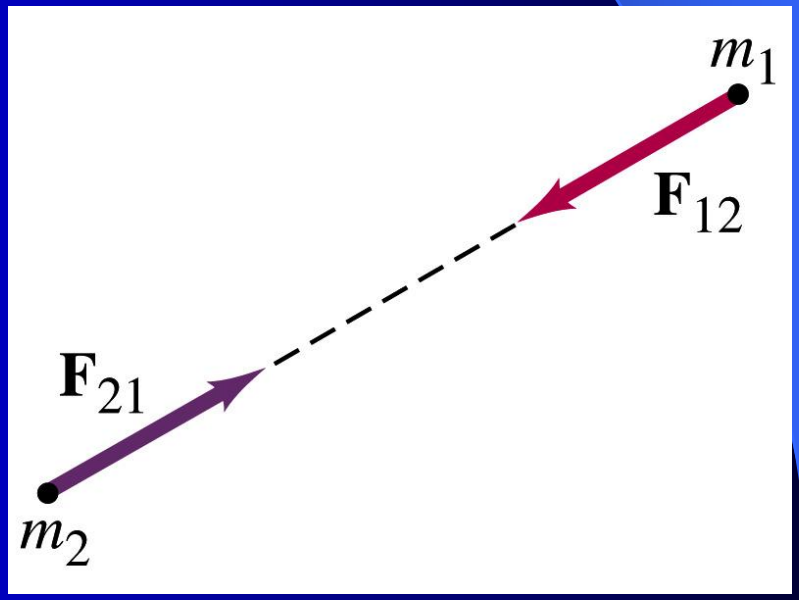
- Gravitational Force acts along the line joining the two objects
- How about if the objects are extended?

$$F = G\,(m_1\, m_2) / r^2$$

$$\mathbf{F_{12}} = -G\,(m_1\, m_2) / r_{21}^2\, \check{\mathbf{r}}_{\mathbf{21}}$$

$$G = 6.67\ 10^{-11}\ \mathrm{N\ m^2/kg^2}$$

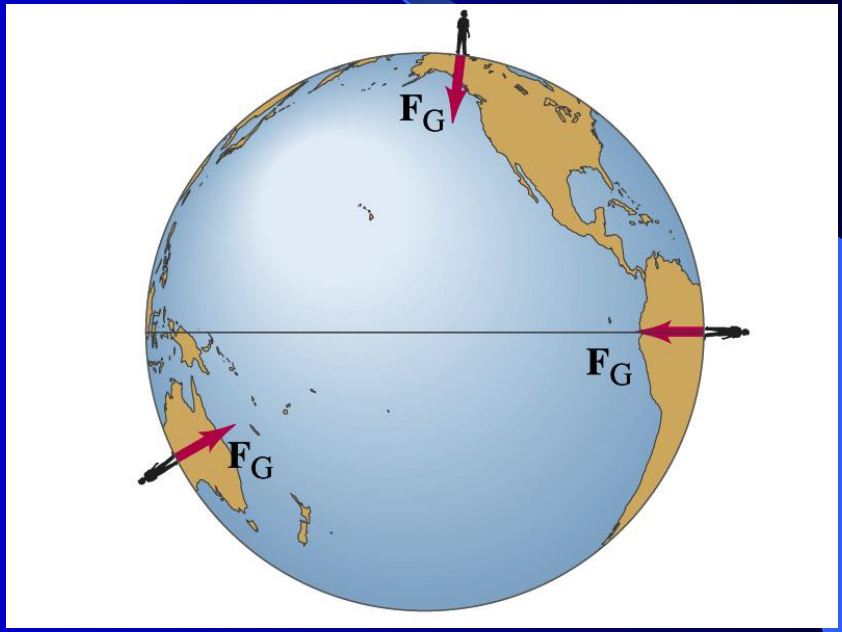




Gravity on the Earth's surface

$$mg = G\,(m\,m_E) / r_E^2$$
$$g = G\,m_E / r_E^2$$

$$m_E = g\,r_E^2 / G$$



Gravity on the Earth's surface and above

$mg = G\,(m\,m_E) / r_E^2$

$g = G\,m_E / r_E^2$

$m_E = g\,r_E^2 / G$

Let's calculate m_E

Geosynchronous Satellite

$m\,v^2 / r = G\,(m\,m_E) / r^2$