Read 6.2 - 6.3

H.W 5 Due today

H.W 6 available

office hours 11:30 - 12:30 today

12:30 - 1:30
2:30 - 4:30
4:30 - 5:30
} TA's

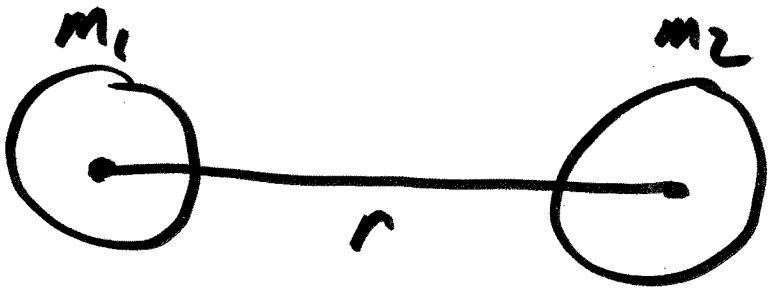
Review

Kepler's Laws

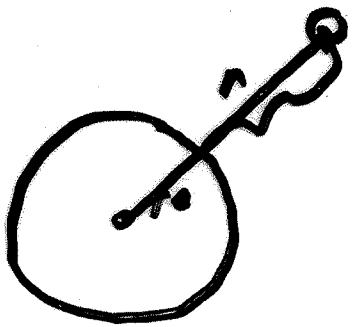
Newton's Law of Gravitation

$$F = \frac{G m_1 m_2}{r^2}$$

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



Problem: How far above the earth must you go for the force you feel to be 1/2 of what it is on the surface of the earth?



Earth's surface $w = mg$

want Force to be $\frac{1}{2}mg$

$F = \frac{1}{2}mg$

$$\frac{GmM_E}{r^2} = \frac{1}{2}mg$$

$$\frac{GM_E}{r^2} = \frac{1}{2} \qquad r^2 = \frac{2GM_E}{1}$$

$$r = \sqrt{\frac{2 \cdot 6.67 \times 10^{-11}\ N\text{-}m^2/kg^2 \cdot 5.97 \times 10^{24}\ kg}{9.8\ m/s^2}}$$

$r = 9 \times 10^6\ m$

$r - r_E = 9 \times 10^6\ m - 6.4 \times 10^6\ m$

$2.6 \times 10^6\ m$

Interactive Question

D

The radius of plant Sooner is identical to that of Earth, yet the mass is twice that of Earth. Your weight on Sooner, compared to your weight on Earth, is

A) quartered.
B) halved.
C) the same.
D) doubled.
E) quadrupled.

Interactive Question

(A)

The radius of plant Boomer is twice that of Earth, yet the two planets have identical masses. Your weight on Boomer, compared to your weight on Earth, is

A) quartered.
B) halved.
C) the same.
D) doubled.
E) quadrupled.

Interactive Question

C

If an artificial satellite is orbiting about the Earth, between the Earth and the moon, how does its period of rotation compare to the moon's period?

A) It is greater.
B) It is the same.
C) It is less.
D) We don't have enough information because it depends on the satellite's speed
E) We don't have enough information because it depends on the satellite's mass

Interactive Question

D

Consider this statement: The Sun exerts a greater gravitational force on the Earth than the moon does, yet the moon is primarily responsible for the tides.
Is this true or not true, and why?

A) It's not true. The moon is closer, so the gravitational force it exerts is stronger than the Sun's.

B) It's not true. The Sun does exert a greater gravitational force so the Sun is responsible for the tides.

C) It's not true. Tides are created by both the Sun and the Moon only when the they line up correctly.

D) It is true. The variation of the gravitational force on the different sides of the Earth from the Moon is greater than the variation on the different sides of the Earth from the Sun because the Moon is closer to the Earth than the Sun.