Extended Gravitation Practice—Pre-AP **Name:**_____

Mass of Earth	5.98×10^{24} kg	**Radius of Earth**	6,378,000 m	**Earth/Sun dist.**	150,000,000,000 m
Mass of Moon	7.35×10^{22} kg	**Radius of Moon**	1,738,000 m	**Earth/Moon dist.**	384,000,000 m
Mass of Sun	1.99×10^{30} kg	**Radius of Sun**	6.96×10^{8} m	**G**	6.67×10^{-11} N*m^2/kg^2
g (Earth)	9.80 m/s^2	**Radius of Mars**	3,398,000 m	**g** (Mars)	3.7m/s^2

1. Using two different methods, calculate the weight of a 25 kg object on Earth.

2. Using the acceleration of gravity on Mars, calculate the mass of the planet Mars.

3. The average distance between the Moon and the Earth is 3.84×10^5 km. Find the net gravitational force the Earth and the Moon exert on a 3.00×10^4 kg spaceship located halfway between them.

Ans:

4. Find the point between the Earth and the Sun at which an object can be placed so that the net gravitational force exerted on it by these two objects is zero.

Ans:

5. A coordinate system (in meters) is constructed on the surface of a table and three masses are placed on the coordinate system as follows: a 2.0 kg mass at the origin, a 3.0 kg mass at (0, 2.0), and a 4.0 kg mass at (4.0, 0). Find the resultant gravitational force exerted on the mass at the origin.

Ans:

6. Practice deriving Newton's Form of Kepler's 3rd Law:

7. Io, one of the four Galilean moons of Jupiter, has an orbital period of 1.77 days and an orbital radius equal to 4.22×10^5 km. From this data, determine the mass of Jupiter.

Ans:

8. Geosynchronous satellites have an angular velocity that matches the rotation of the Earth and follow circular orbits in the equatorial plane of the Earth. (Almost all communication satellites are geosynchronous and appear to be stationary above a point on the Earth's equator.) What is the radius of a geosynchronous satellite? How high (in miles) is this above the Earth's surface?

Ans:

Ans: