Orbit Problems: Name_______________________

1. What is the orbital velocity 3400 m from the center of a 5.6 x 10^{18} kg asteroid? (331.4 ≈ 330 m/s)

2. You find that you can orbit at 516 m/s 12,150 m from the center of a small moon. What is its mass? (4.85 x 10^{19} kg)

3. A satellite orbits a planet at a distance of 7.5 x 10^{6} m from the center every 8900 seconds. What is the mass of the planet? (3.2 x 10^{24} kg)

4. What distance from the center of Earth's moon is your orbital velocity 120 m/s? (3.4×10^8 m)

5. What is the period of orbit of a satellite that orbits 1.95×10^6 m from the center of Earth's moon?
(7730 s)

6. What is the radius of an orbit with a period of 3.16×10^7 s around the sun? (1.50×10^{11} m – yep – it's the earth)

Use $\frac{m_s v^2}{r} = \frac{G m_c m_s}{r^2}$ or $\frac{m_s 4\pi^2 r}{T^2} = \frac{G m_c m_s}{r^2}$ Which come from: $F = \frac{G m_c m_s}{r^2}$, and $a = \frac{4\pi^2 r}{T^2} = \frac{v^2}{r}$ and $F = ma$

<u>Useful things to know:</u>

Mass of the Earth	5.97×10^{24} kg	Radius of the Moon	1.738×10^6 m
Mass of the Moon	7.35×10^{22} kg	Radius of the Earth	6.38×10^6 m
Mass of the Sun	1.99×10^{30} kg	Earth-Moon Distance	3.84×10^8 m
$G = 6.67 \times 10^{-11}$ Nm^2/kg^2		Earth-Sun Distance	1.496×10^{11} m