

1. An asteroid has a mean radius of orbit of $4.8 \times 10^{11} m$. What will be its orbital period around the sun? [$1.8 \times 10^8 s$]
2. A spy satellite is located one Earth radius above the surface of the Earth. What is its period of revolution? [$1.5 \times 10^4 s$]
3. Mars has two moons, Phobos and Deimos (Fear and Panic, companions of Mars, the god of war). Deimos has a period of 30h 18min and a mean distance from the center of Mars of $2.3 \times 10^4 km$. If the period of Phobos is 7h 39min, what mean distance is it from the center of Mars? [$9.2 \times 10^6 m$]
4. At a certain point between the Earth and the moon the total gravitational force exerted on an object by the Earth and the moon is zero. If the Earth-moon distance is $3.84 \times 10^5 km$ and the moon has 1.2% of the Earth's mass, where is this point located? Are there any other such points? [$3.46 \times 10^8 m$ from Earth]
5. The planet Saturn has a mass of $5.67 \times 10^{26} kg$ and a radius of $6.3 \times 10^7 m$. Calculate the acceleration due to gravity on Saturn. How much will the gravitational force be on a 60kg man there? [$9.5 m/s^2$, $5.7 \times 10^2 N$]
6. It can be assumed that the Earth, to a good approximation, moves in a circular orbit about the sun. Using only the data for the Earth's orbit from the table provided in your notes, determine
 - a. The speed of the Earth [$2.96 \times 10^4 m/s$]
 - b. The mass of the sun. [$1.95 \times 10^{30} kg$]
7. You are on a strange planet. You know that the stars do not rise and set, but circle around in planes parallel to the horizon.
 - a. You set out on a journey that takes you in a straight line (really a great circle) for $1.5 \times 10^4 km$, and find that the stars now rise and set perpendicular to the horizon. What is the radius of the planet (SIN '74) [$9.5 \times 10^6 m$]
 - b. You drop a stone from a height of 2.0m and measure the time that the stone takes to fall to the ground, which is 0.52s. What is the mass of the planet? [$2.0 \times 10^{25} kg$]
8. Pg 314 #20, 21, 23

20. Find the speed of an Earth satellite in orbit 400 km above Earth's surface. What is the period of the orbit?
21. Find the altitude of a communications satellite that is in geostationary Earth orbit above the equator.
22. When the space shuttle delivers a crew to the International Space Station, it usually boosts the orbit of the station from about 320 km to 350 km. How much energy does the shuttle add to the station's orbit?
23. a) Show that speed decreases as the radius of a satellite's orbit increases.
b) What effect does increasing an orbit's radius have on the period of the satellite?

So figured out why you can't do this question?