

Circular Motion

Gravitation

For the Problems: $T_{\text{moon}} = 27.4 \text{ days}$ $r_{\text{moon(orbital)}} = 3.84 \times 10^8 \text{ m}$
 $r_{\text{moon}} = 1.74 \times 10^6 \text{ m}$ $m_{\text{moon}} = 7.35 \times 10^{22} \text{ kg}$ $m_e = 5.98 \times 10^{24} \text{ kg}$
 $r_e \text{ (orbital)} = 1.50 \times 10^{11} \text{ m}$, $r_e = 6.38 \times 10^6 \text{ m}$; $m_N = 1.03 \times 10^{26} \text{ kg}$;
 $r_N = 2.27 \times 10^7 \text{ m}$; $r_{\text{on}} = 4.50 \times 10^{12} \text{ m}$, $m_s = 1.99 \times 10^{30} \text{ kg}$

1. a) What is the orbital radius of a spy satellite if it circles the earth once every 3 days?
b) What would the speed of the satellite be as it circles?
2. What would “g” be on the surface of the Neptune?
3. What is the force of attraction between the Sun and Neptune?
4. What speed does Neptune orbit the Sun at?... What’s its period?
5. What is the force of attraction between the earth and Neptune?... b) the net force acting on the earth if the Sun, earth, and Neptune are on the same plane (earth and Neptune on the same orbital side)?
6. Using the information of the moon determine the mass of the earth.
7. A space station is 2.0 km in diameter and rotates at 1.0 rpm’s. a) What velocity does it rotate at? b) What centripetal force does it produce to keep me (a 90 kg person) in a circular path? c) How does this compare to my weight on earth?
8. If the sun were to become a *black hole* it would implode to the size of about 3 km (a radius of 1500 m) What would gravity be on its surface?
9. Where would we put a satellite if we wanted it to circle 4 times a day?