Answer Key

1. EÊÊÊ ¸ám$(\omega A)^2 = (2/2)[(\pi/2)(6/\pi)]^2 = 9J$
2. CÊÊÊ $mv^2/r = GmM/r^2 \rightarrow v^2 = GM/r$ÊÊ small r, big v
3. DÊÊÊ $6.67\times10^{-11}(1.67\times10^{-27})(9.1\times10^{-31})/(5.92\times10^{-11})^2 = 3.62\times10^{-47}\ N$
4. DÊÊÊ $(g/9)/g = R_E^2/r^2 \rightarrow r = 3R_E$
5. CÊÊÊ $U_1/U_2 = r_2/r_1 = 3R_E/2R_E = 3/2$
6. EÊÊÊÊ constant velocity
7. CÊÊÊ (300)áx = (200)á(10-x)ÊÊÊ 3x = 20-2xÊÊÊÊÊ x=4*m*
8. CÊÊÊÊ at equilibrium
9. DÊÊÊÊÊ zero
10. EÊÊÊÊÊ $T = 2\pi/\pi = 2$*sec*.ÊÊÊÊÊ thus 5 in 10 *sec*.
11. a)ÊÊÊÊ 1/1*sec*. $=(1/2\pi)\sqrt{(10/m)}$ÊÊÊ $m=10/4\pi^2 = 0.253$ *kg*
    b)ÊÊÊÊ ¸ámv_M^2 = ¸ák$A^2 \rightarrow A = v_M\sqrt{(m/k)} = 2\pi\sqrt{([(10/4\pi^2)/10]} = 1$ *m*
    c)ÊÊÊÊÊ $y(t) = (1\ m)\sin(2\pi t) = (1\ m)\cos(2\pi t-\pi/2) = (1\ m)\cos(2\pi t+3\pi/2)$
    d)ÊÊÊÊ $v(t) = dy/dt = (2\pi\ m/s)\cos(2\pi t) = -(2\pi\ m/s)\sin(2\pi t-\pi/2) = -(2\pi\ m/s)\sin(2\pi t+3\pi/2)$
    e)ÊÊÊÊ $2\pi t = \pi/2 \rightarrow t = 1/4$ *sec.*
12. a)ÊÊÊÊ $GmM_E/(2R_E)^2 = (m/4)(GM_E/R_E^2) = mg/4 = 10^5$á9.81/4 $= 2.45\times10^5\ N$
    b)ÊÊÊÊ $F/m = 2.45\times10^5\ N/10^5\ kg = 2.45\ m/s^2$
    c)ÊÊÊÊ $v^2/2R_E = 2.45\ m/s^2 \rightarrow v = \sqrt{(4.9R_E)} = \sqrt{[(4.9)(6.371\times10^6)]} = 5.59\times10^3\ m/s$
    d)ÊÊÊÊ $T = 2\pi(2\times6.371\times10^6)/(5.59\times10^3) = 1.43\times10^4$ *sec.* = 3.97 *hr.*