From Ch. 8

• If the moon had 1/4-th the radius of earth and 1/81-th of the earth's mass what would be the acceleration due to gravity on its surface? Answer: $g_m = 2$ m/s^2.

• What would be the speed of a satellite of the earth, in a circular orbit of radius $10R_e$? Answer: 2.5 km/s.

• If an object is launched from the surface of earth at v_0, how high does it go? Answer: measuring from the center of the earth, $r_{\max} = R_e/[(v_0^2)/(2gR_e))-1]$. To get h, the distance above the surface, subtract R_e from $r_{\max}$.

• An alien starship is in orbit above an alien planet. The radius of the orbit is 10^8 m and the period is 10 hours. What is the mass of the planet? Answer: About 4.5 $\times 10^{26}$ kg.

• An object is held at rest a distance h above the earth's surface, where h can be any distance at all. When dropped, with what speed does it impact the surface? [Neglect the atmosphere, and the earth's various motions.] Answer:

$$v_f = \sqrt{2gR_e[1 - (R_e/(R_e + h))]}.$$

• An object is in an elliptical orbit and at a given

instant it is halfway between its point of closest approach and point of furthest approach. How far is it from the body it is orbiting, if $b/a = 0.5$ for the orbit. Answer: $r = a$.