

PHYS 105

In-class exercise 9.1(b)

Suborbital Motion: Newton's Law of Gravity

Of course, the acceleration due to gravity isn't uniform when we consider scales on which Earth's curvature is non-negligible. Rather, it is always directed toward Earth's center and varies as the inverse square of r . Modify the program to use the following expressions for the acceleration:

$$a_x = -\frac{GMx}{r^3}$$
$$a_y = -\frac{GM y}{r^3}$$

(why do these describe an inverse square law?), and repeat the previous problem. For consistency, take $GM = gR^2$. Remember that both components of the acceleration have to be recomputed for the corrector step. Answer the same questions as in the previous questions. By how much do the range, maximum height, and time of flight differ from the case of uniform gravity and zero curvature?