54.2: Gravitational Potential

Sometimes it is useful to define a gravitational potential, which is a property of space, rather than a property of the bodies present the way force and potential energy are. To find the gravitational potential, suppose we have a mass m creating a gravitational field in space. We put a small "test mass" m_0 in space near mass m, determine the gravitational potential energy on the test mass due to m 's mass, and divide the resulting potential energy by m_0. The result is the gravitational potential $\mathscr{E}$. For a point mass m,

$$\mathscr{E} = -\frac{Gm}{r}. \tag{54.2.1}$$