

THE WORK INTEGRAL

THE ENERGY TRANSFORMATION: GRAVITATIONAL POTENTIAL TO KINETIC ENERGY

WORK DONE BY MG:

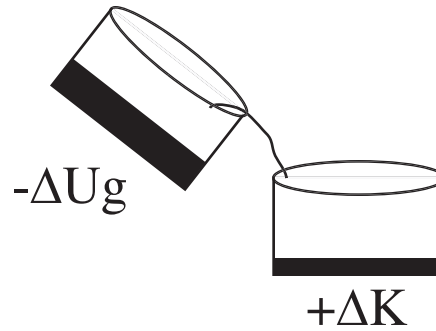
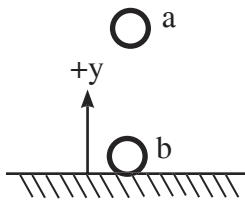
$$W = \int_a^b F(y) \cdot dy$$

$$W_{Fgravity} = \int_a^b \left| -mg \right| \left| dy \right| \cos 0$$

$$W_{Fgravity} = mgy \Big|_a^b = (mgb) - (mga) = "-"$$

$$\int_a^b = - \int_b^a \quad W_{Fgravity} = mga - mgb = "+"$$

$$W_{Fgravity} = \Delta K = -\Delta U$$



WORK DONE BY GMm/r²

$$W = \int_a^b F(r) \cdot dr$$

$$W_{Fgravity} = \int_a^b \left| -\frac{GMm}{r^2} \right| \left| dr \right| \cos 0$$

$$W_{Fgravity} = -\left[\frac{GMm}{r} \right]_a^b = \left(-\frac{GMm}{b} \right) - \left(-\frac{GMm}{a} \right) = -\frac{GMm}{b} + \frac{GMm}{a} = "-"$$

$$\int_a^b = - \int_b^a \quad W_{Fgravity} = \left(\frac{GMm}{b} \right) - \left(\frac{GMm}{a} \right) = "+"$$

$$W_{Fgravity} = \Delta K = -\Delta U$$

