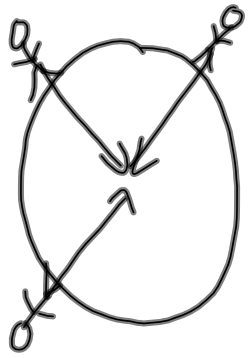
§6-3 Potential Energy and the Work-Energy Theorem

What is potential energy and how does it relate to work?

Gravitational Potential Energy

Gravitational potential energy is the energy that an object possesses due to its position in a gravitational field.

$$E_g = mgh$$



Where E_g is the gravitational potential energy (J)

m is the mass (kg)

h is the height above a certain reference level (m)

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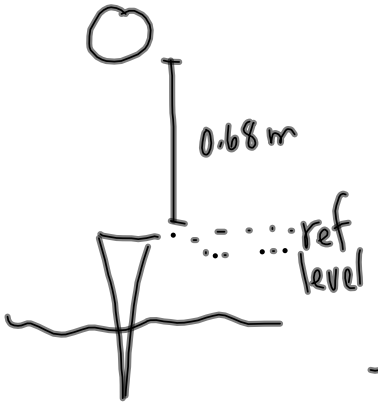
$m = 3.0\,kg$

$h = 0.68\,m$

$E_g = ?$



$E_g = mgh$

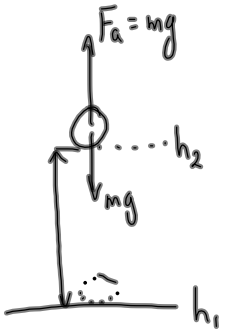
$E_g = (3.0\,kg)(9.81\,m/s^2)(0.68\,m)$

$E_g = 2.0 \times 10^1\,J$

The rock has 2.0×10^1 J of potential energy with respect to tent peg.

Work + Gravitational Potential Energy

You must do work in order to change an objects gravitational potential energy.



$W = F_{\parallel} \Delta d$

$W = mg(h_2 - h_1)$

$W = mgh_2 - mgh_1$

$W = E_{g_2} - E_{g_1}$

$W = \Delta E_g$ ← Work-energy theorem

The work done in changing an objects gravitational potential energy is equal to the change in gravitational potential energy

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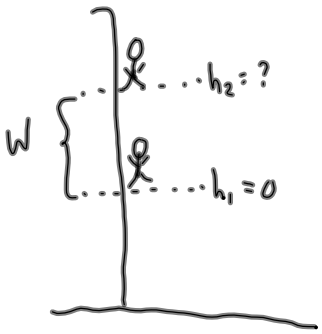
$m = 65.0\,kg$

$W = 1.60 \times 10^4 J$

$\Delta h = ?$



$W = \Delta E_g$

$W = E_{g_2} - \cancel{E_{g_1}}^{0}$

$W = mgh_2$

$h_2 = \frac{W}{mg}$

$h_2 = \frac{1.60 \times 10^4 J}{(65kg)(9.8 m/s^2)}$

$h_2 \doteq 25.1 m$

The rock climber ascended 25.1m

TO DO: PP|250 #28 (hint..... $1 cm^3 = 1 mL$)

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