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

Gravitational Potential Energy:

- depends on mass and height (also the acceleration due to gravity)

$$E_g = mgh$$

Where E_g is the gravitational potential energy (J)
m is the mass (kg)
g is the acceleration due to gravity (9.81 m/s^2)
h is the height above a given reference level (m)

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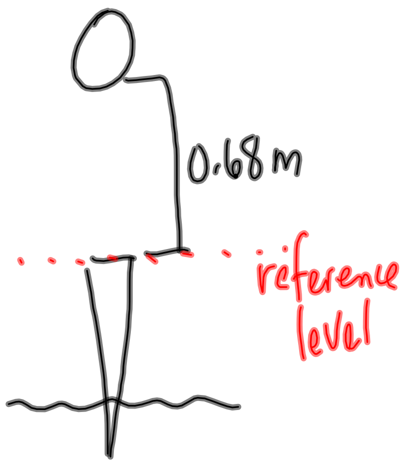
$m = 3.0\,kg$

$h = 0.68\,m$

$E_g = ?$



$E_g = mgh$ $\quad N \cdot m =$

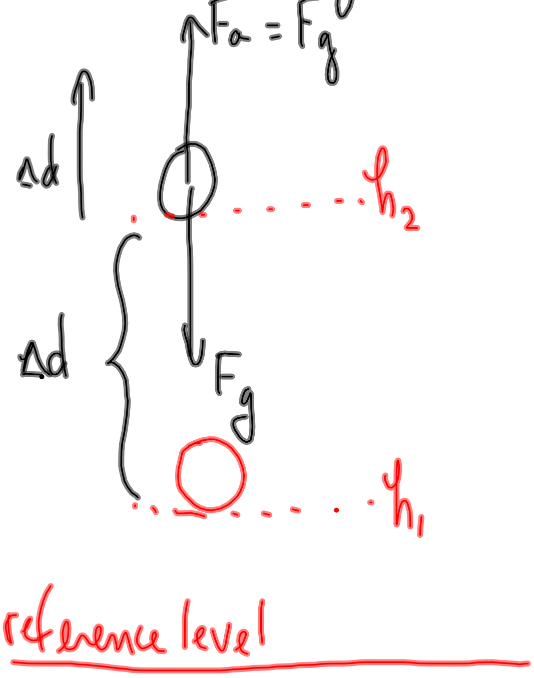
$E_g = (3.0\,kg)(9.81\,m/s^2)(0.68$

$$\boxed{E_g \doteq 2.0 \times 10^1\,J}$$

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

Work must be done in order to transfer energy to any object.

Consider lifting a rock (at a steady pace):



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

$$W = F_g (h_2 - h_1)$$

$$W = mg(h_2 - h_1)$$

$$W = mgh_2 - mgh_1$$

$$W = E_{g2} - E_{g1}$$

$$W = \Delta E_g$$

WORK-ENERGY THEOREM.

Work is equal to the object's change in gravitational potential energy.

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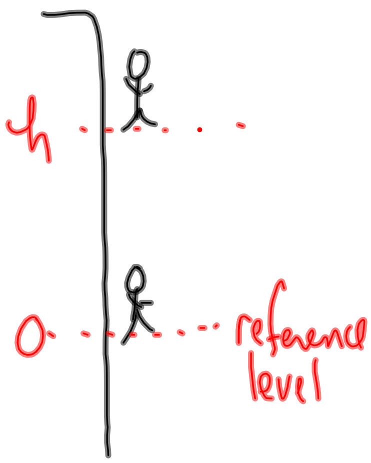
$m = 65.0\,kg$

$W = 1.60 \times 10^4\,J$

$h = ??$



$W = \Delta E_g$ (The work-energy theorem)

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

$W = mgh$

$h = \dfrac{W}{mg}$

$h = \dfrac{1.60 \times 10^4\,J}{(65.0\,kg)(9.81\,m/s^2)}$

$h = 25.1\,m$

The rock climber ascended 25.1 m

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