## Work & Energy

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

$W = F\Delta d\cos\theta$

W is the area under a F-d graph

$E_k = \frac{1}{2}mv^2$

$W = \Delta E_k$ (work-energy theorem)

## §6-3 Potential Energy and Work.

gravitational potential energy ~ stored energy due to the object's position above a certain reference level

$$E_g = mgh$$

where $E_g$ is the gravitational potential energy (J)
m is mass (kg)
g is 9.81 m/s² (near the Earth's surface)
h is the height above the reference level (m)

**MP/249**

m = 3.0 kg
h = 0.68 m (relative to tent peg)
$E_g = ?$

$E_g = mgh$

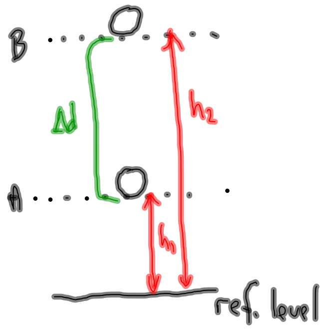
$E_g = (3.0\,kg)(9.81\,m/s^2)(0.68\,m)$

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

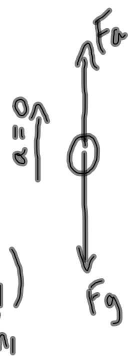
The rock has $2.0 \times 10^1$ J of potential energy relative to the tent peg.

## Work & Potential Energy:

Consider lifting an object from position A at $h_1$ to position B at $h_2$:




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




$W = F_a \Delta d$

$W = F_g \Delta d$

$W = mg\Delta d$

$W = mg(h_2 - h_1)$

$W = mgh_2 - mgh_1$

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

$\boxed{W = \Delta E_g}$

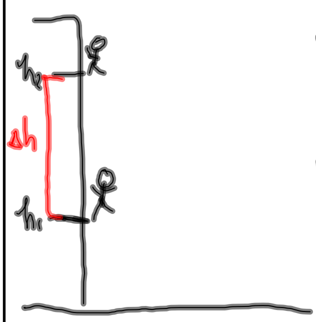
WORK-ENERGY THEOREM

### MP|252

$m = 65.0\,kg$

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

$\Delta h = ?$




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

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

$W = mgh_2 - mgh_1$

$W = mg(h_2 - h_1)$

$W = mg\Delta h$

$\Delta h = \frac{W}{mg}$

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

$\boxed{\Delta h = 25.1\,m}$

The rock climber ascended 25.1 m

### To Do:

1. PP|250
2. PP|254
3. Assignment due Thurs.