

# Energi

$$W = F \cdot s = F_x \cdot s = F \cos \alpha \cdot s$$



$$F: [N] \quad s: [m]$$

$$E = W \Rightarrow [N \cdot m]$$

Kinetisk energi (bevegelesenergi)

$$E_k = \frac{1}{2} m \cdot v^2$$

Potensiell energi:

→ Tyngdefeltet

$$E_p = mgh$$

↑ masse 9,81 m/s<sup>2</sup> ↑ høyden

→ Fjær

$$E_p = \frac{1}{2} k \cdot x^2$$

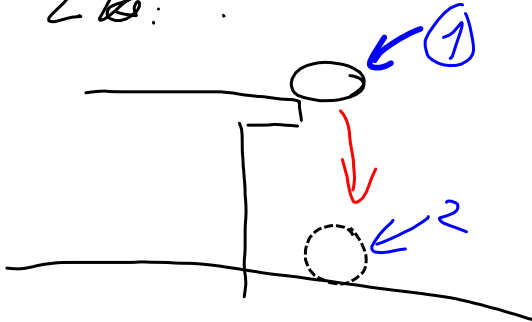
↑ fjærkonstant ↑ avstand

→ .....

Mekanisk energi:

$$E_m = E_k + E_p \quad (= \text{bevares})$$

$E_k$ :



$$E_{m1} = E_{m2}$$

$$E_{k1} + E_{p1} = E_{k2} + E_{p2}$$

Effekt

$$P = \frac{E}{t}$$

$\leftarrow [J]$   
 $\leftarrow [s]$

$\uparrow$   
 $[W]$

$\uparrow$   
 Watt

$$[W] = \left[ \frac{J}{s} \right]$$

$$[J] = [W \cdot s]$$

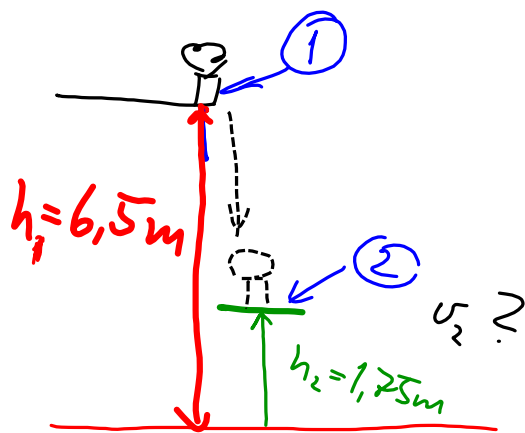
1,0 kWh  
 $\uparrow$   $\uparrow$   $\uparrow$   
 kilo Watt time  
 ( $10^3$ )

$$1,0 \text{ kWh} = 1,0 \cdot 10^3 \cdot 3600 \text{ [s]} \cdot \text{[W]} = 3,6 \cdot 10^6 \text{ [W}\cdot\text{s]}$$

$\uparrow$   $\uparrow$   $\uparrow$   $\uparrow$   
 $10^3$   $3600 \text{ s}$   $k$   $h$

$$= 3,6 \cdot 10^6 \text{ [J]}$$

4,12



$$E_{p1} + E_{k1} = E_{p2} + E_{k2}$$

$\rightarrow$  står i ro på balkkragen

$$mgh_1 = mgh_2 + \frac{1}{2}mv_2^2 \quad | : m$$

$$gh_1 = gh_2 + \frac{1}{2}v_2^2$$

$$\frac{1}{2}v_2^2 = gh_1 - gh_2 = g(h_1 - h_2)$$

$$v_2 = \sqrt{2 \cdot g \cdot (h_1 - h_2)} = \sqrt{2 \cdot 9,81 \cdot (6,5 - 1,75)} \left[ \frac{\text{m}}{\text{s}^2} \cdot \text{m} \right]$$

$$v_2 = 9,65 \left[ \frac{\text{m}}{\text{s}} \right]$$

b) Farten  $v$  blir mindre da  $(h_1 - h_2)$  er mindre

c)



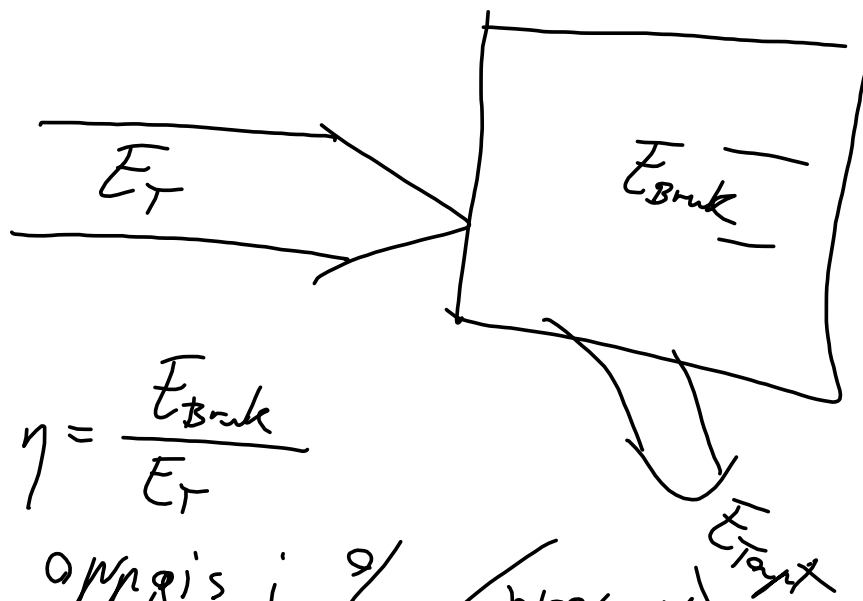
$$F = m \cdot a = m \cdot g$$

$m$  er mindre, så da er  $F$  mindre

## Virkningsgrad

$$\eta = \frac{\text{Energi som blir brukt}}{\text{Energi som går inn i systemet}}$$

Symbol



$$\eta = \frac{E_{bruk}}{E_T}$$

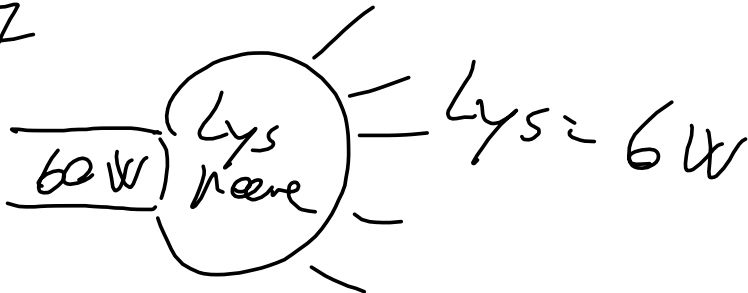
oppgis i % (prosent)

Ekse:

$$\frac{9 \text{ W}}{10 \text{ W}} = 0,9 \Rightarrow 90\%$$

4.27

a)



Virkningsgraden

$$\eta = \frac{6 \text{ W}}{60 \text{ W}} = 0,1 \Rightarrow 10\%$$

b)

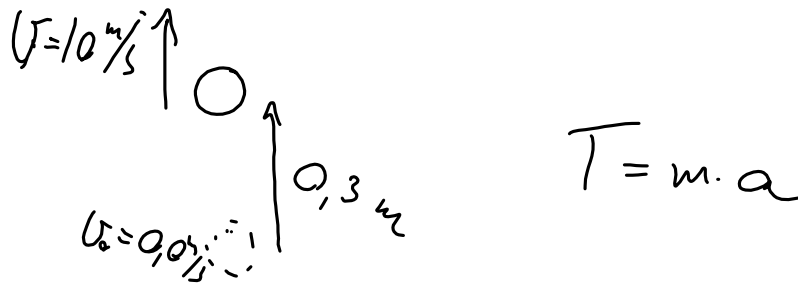
6,0 W lys

$$\eta = 80\%$$

$$\frac{E_{\text{lys}}}{E_{\text{tilført}}} = \eta = 0,8$$

$$E_{\text{tilført}} = \frac{6,0 \text{ W}}{0,8} = 7,5 \text{ W}$$

4.16



$$a = \frac{\Delta v}{\Delta t}$$

$$a = \frac{v^2 - v_0^2}{2s} = \frac{10^2 - 0^2 \left[ \frac{\text{m}^2}{\text{s}^2} \right]}{2 \cdot 0,3 \text{ [m]}}$$

$$= \frac{100}{0,6} \left[ \frac{\text{m}}{\text{s}^2} \right] = 167 \left[ \frac{\text{m}}{\text{s}^2} \right]$$

$$T = m \cdot a = 0,120 \text{ [kg]} \cdot 167 \left[ \frac{\text{m}}{\text{s}^2} \right] = 20 \text{ [N]}$$

