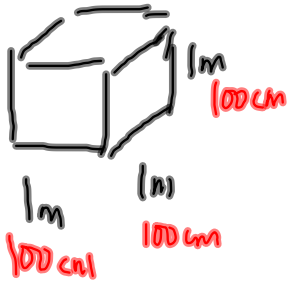
From HW (BP 250)

28.



$d = 1.00\ kg/L$

$V = 100cm \times 100cm \times 100cm$

$V = 1 \times 10^6\ cm^3$

$V = 1 \times 10^6\ mL$

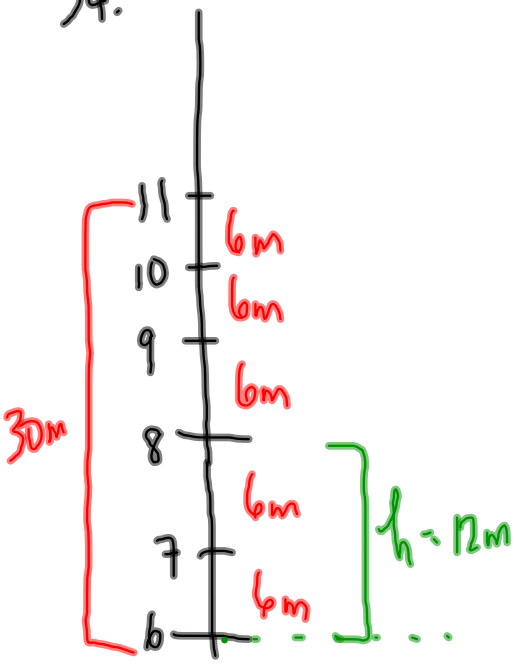
$V = 1 \times 10^3\ L$

$m = 1 \times 10^3\ kg$

$d = \frac{m}{V}$

$m = Vd$

34.



a) $E_g = mgh$

$E_g = (1.35 \times 10^3\ kg)(9.81\ m/s^2)(12m)$

$E_g = 1.6 \times 10^5\ J$

§6-4 Power & Efficiency

What is the horsepower generated when running up the stairs?

L

$F_g = 705N$
$\Delta d = 8(19cm)$
$\Delta t = 1.69s$

$W = F_{||} \Delta d$
$W = F_g \Delta d$
$W = (mg) \Delta d$
$W = (705N)(8)(0.19m)$
$W = 1071.6J$

Work done per second:

$P = \frac{W}{\Delta t} = \frac{1071.6J}{1.69s}$ W

$\frac{W}{\Delta t} = 634 \frac{J}{s}$ Watts

P

$F_g = 455N$
$\Delta d = 8(19cm)$
$\Delta t = 2.31s$

$W = F_g \Delta d$
$W = (455N)(8)(0.19)$
$W = 691.6J$

Work done per second:

$\frac{W}{\Delta t} = \frac{691.6J}{2.31s}$

$\frac{W}{\Delta t} = 299 \frac{J}{s}$

Power: $P = \frac{W}{\Delta t}$ ← work.

$1 hp = 746 W$

L's power $= \frac{634 \frac{J}{s}}{746 W} = 0.850 hp$

P's power $= \frac{299 W}{746 W} = 0.400 hp$

" "

Power Bill

We pay for kW·h

P Δt

work/energy units

J

$P = \frac{W}{\Delta t}$

$W = P \Delta t$

Efficiency

$$\text{Efficiency} = \frac{E_O}{E_I} \times 100\%$$

where E_O is the output (useful) energy (J)
E_I is the input energy. (J)

MP|269

$E_I = 3.50 \times 10^3 J$ ← input.

$h = 1.00 \times 10^2 m$
$m = 0.500 kg$
} E_g (output)

$E_g = mgh$
$E_g = (0.500kg)(9.81 m/s^2)(100m)$
$E_g = 490.5 J$

$$\text{Efficiency} = \frac{E_O}{E_I} \times 100\%$$

$$\text{Efficiency} = \frac{490.5 J \text{ ← output}}{3.5 \times 10^3 J \text{ input}} \times 100\%$$

Efficiency = 14%

14% of the Chemical Potential energy was transformed into gravitational potential energy.

To DO

① PP|266 (Look over MP|263 + 264)
② PP|270-271