28.

PP|250

$E_g = mgh$

$V = (100cm)^3$

$V = 10^6 \ cm^3$

$V = 10^6 \ ml$

$V = 10^3 \ L$

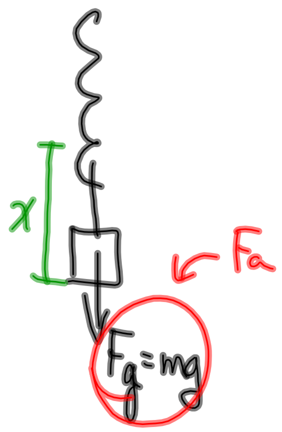
$m = 1 \times 10^3 \ kg$

factor labelling:

$$x \ kg = 1m^3 \left(\frac{100cm}{1m}\right)^3 \left(\frac{1mL}{1cm^3}\right)\left(\frac{1L}{1000mL}\right)\left(\frac{1.000kg}{1L}\right)$$

PP|254 => $W = \Delta E_g$ (Work-Energy Theorem).

PP|258 => $F_a = kx$ (Hooke's Law)



$E_e = \frac{1}{2}kx^2$

PP|261 $W = \Delta E_e$ (Work-Energy Theorem)

Power

S → $F_g = 740N$
$\Delta d = 8 \times 18cm$
$\Delta t = 1.84s$

J → $F_g = 675N$
$\Delta d = 8 \times 18cm$
$\Delta t = 5.18s$

$W = F_{\parallel} \Delta d$
$W = (740N)(8 \times 0.18m)$
$W = 1065.6J$

$W = F_{\parallel} \Delta d$
$W = (675N)(8 \times 0.18m)$
$W = 972J$

$Power = \frac{1065.6J}{1.84s}$

$Power = 579.13 \frac{J}{s}$

$P = 5.8 \times 10^2 W$

$P = \frac{972J}{5.18s}$

$P = 187.64 \frac{J}{s}$

$P = 1.9 \times 10^2 W$

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

where P is the power (J/s or W)
W is the work (J)
Δt is the time (s)

Power is the rate at which the work is done.

MP|263

$W = 1.50 \times 10^5 J$
$\Delta t = 10.0s$
$P = ??$

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

$P = \frac{1.50 \times 10^5 J}{10.0s}$

$P = 1.50 \times 10^4 W$

MP|264... look over

A note about units:

Your "Power" bill charges you for kW·h (kW = P, h = Δt)

You are really charged for Work! ($W = P\Delta t$) not power

→ work done for electrical energy

Efficiency

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

where E_O is the "useful energy" (J)
E_I is the input energy (J)

mp|269

$E_I = 3.50 \times 10^3$ J
$m = 0.500$ kg
$h = 1.00 \times 10^2$ m
Efficiency = ?

$E_g = mgh$ (useful energy)
$E_g = (0.500\text{ kg})(9.81\text{ m/s}^2)(1.00 \times 10^2\text{ m})$
$E_g = 4.905 \times 10^2$ J

$$\text{Efficiency} = \frac{4.905 \times 10^2\text{ J}}{3.50 \times 10^3\text{ J}} \times 100\%$$

Eff = 14.0%

To Do

1. PP|266 (Power)
2. PP|270-271 (Efficiency)
3. p277|34-39 (Review)