② $R = 25\,\Omega$

$V_{eau} = 200\,L$ $\quad m_{eau} = 200\,kg$

$\theta_i = 15°C$

$\theta_f = 60°C$ $\quad \Delta\theta = 45°C$

prix kWh $= 0{,}2\,€/kWh$

? Δt

Electrique $\longrightarrow$ Q chauffage

eff Joule

$W_{th} = RI^2\Delta t$ $=$ $Q = c.m.\Delta\theta$

$\searrow$ perd $=$ $\nearrow$ gain

$\boxed{Q = c.m.\Delta\theta} = 4190 . 200 . 45 = \boxed{37710000\,J}$

$c_{eau} = 4190\,J/kg.K$

$W_{th} = Q = 37710000\,J$

? Δt $\quad \boxed{W_R = RI^2\Delta t}$

$\rightarrow \boxed{\Delta t} = \dfrac{W_{th}}{RI^2} = \dfrac{37710000}{25.(9{,}2)^2} = \boxed{17821\,s}$

? I $\quad P = U.I$

$\boxed{R = \dfrac{U}{I}}$

$\rightarrow I = \dfrac{U}{R} = \dfrac{230}{25} = 9{,}2\,A$

$U = 230\,V$ car dans maison

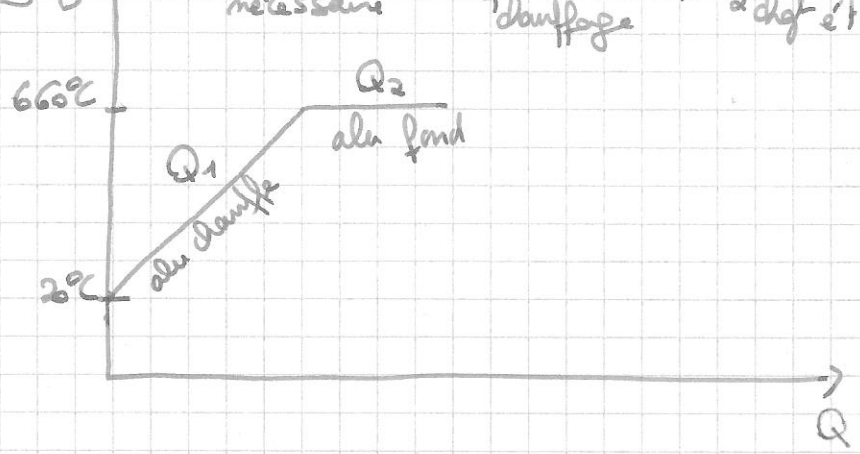
? $\boxed{cout} = W_{enkWh} . prix_{enkWh} = 10{,}47 . 0{,}2 = \boxed{2{,}09\,€}$

? $W_{enkWh} = P_{enkW} . \Delta t_{enh} = 2{,}116 . 4{,}95 = 10{,}47\,kWh$

$\Delta t = 17821\,s = 4{,}95\,h$

? $P = U.I = 230 . 9{,}2 = 2116\,W = 2{,}116\,kW$

(3) θ ? $Q_{nécessaire} = Q_{1\ chauffage} + Q_{2\ chgt\ état}$



$Q_1 = c\ m\ \Delta\theta = 900 . 0,02 . 640 = 11520\ J$

$c_{alu} = 900\ J/kg.K$

$m = 20\ g = 0,02\ kg$

$\theta_i = 20°C$ $\quad \Delta\theta = 640°C$

$\theta_f = 660°C$

$Q_2 = L_f . m \quad = 390000 . 0,02 = 7800\ J$

$L_{f\ alu} = 390\ kJ/kg = 390000\ J/kg$

? $\boxed{Q_{nécessaire}} = Q_1 + Q_2 = 11520 + 7800 = \boxed{19320\ J}$

Electrique → Q
par effet Joule
$W_{el} = R . I^2 . \Delta t$

(ou) $W = P . \Delta t$

$W = Q = 19320\ J$

W travail électrique nécessaire

? $\boxed{\Delta t} = \frac{W}{P} = \frac{19320}{2500} = \boxed{7,728\ s}$

$P = 2500\ W$

$I_{max} = 10\ A \qquad P = U . I$

$I = \frac{P}{U} = \frac{2500}{230} = 10,86\ A > 10\ A$ pas permis par fusible : il saute

$U = 230$ ✓ car dans maison

4. ? Q

$E_p \downarrow + E_k \downarrow$ (= $E_{méca} \downarrow$ perte) $\longrightarrow$ Q gagnée

$m = 80\,T = 80\,000\,kg$

h	$E_p = m.g.h$	v	$E_k = \frac{m v^2}{2}$	$E_{méca} = E_p + E_k$
300 km 300 000 m	$2,35.10^{17}$ J	27000 km/h 7500 m/s	$2,25.10^{12}$ J	$2,485.10^{12}$ J
			perte $\longrightarrow$ Q $= -2,48.10^{12}$ J	
0 m	0 J	700 km/h 194,4 m/s	$1,51.10^{9}$ J	$1,51.10^{9}$ J

$\Delta E_{méca} = -2,48.10^{12}$ J

$Q = -\Delta E_{méca} = +2,48.10^{12}$ J

? m_{eau}

$\theta_i = 0°C$ $\quad \Delta\theta = 100°C$

$\theta_f = 100°C$

$c_{eau} = 4190$ J/kg.K

$Q = c\, m\, \Delta\theta$

$m_{eau} = \frac{Q}{c\,\Delta\theta} = \frac{2,48.10^{12}}{4190 . 100} = 5918854$ kg

chaleur dissipée équivalente à

5919 m^3 d'eau portée de 0°C à 100°C