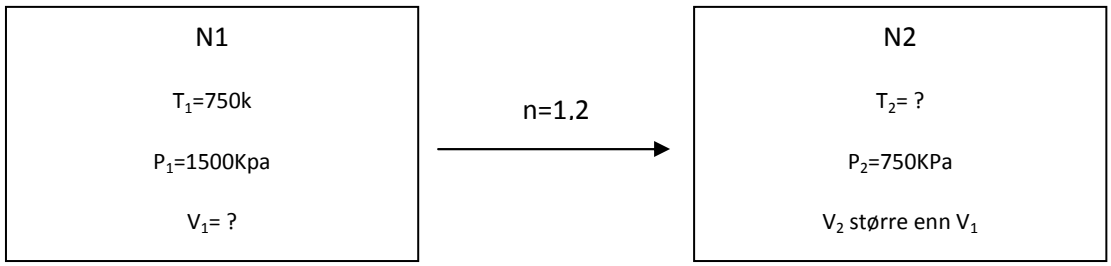
Obligatorisk innlevering 2 i Energiteknikk

Oppgave 2

Dette er en polytropisk prosess.



$R_{N2} = 0{,}2968 KJ/kg \cdot k$

$P_{v1}\, T_1 = P_{v2}\, T_2$

$\frac{T_1}{T_L} = (\frac{P_1}{P_L})^{\frac{n-1}{n}}$

$T_2 = \frac{T_1}{(\frac{P_1}{P_L})^{\frac{n-1}{n}}}$

$T_2 = \frac{750}{\frac{1500}{750}^{\frac{1{,}2-1}{1{,}2}}}$

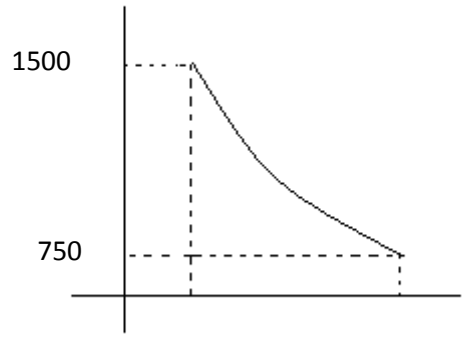
$T_2 = \underline{668{,}17k}$

$P_v = R_{N2} \cdot T$ $\qquad V = \frac{T \cdot R_{N1}}{p}$ $\qquad V_1 = \frac{0{,}2968 \cdot 750}{1500} = 0{,}1484$

$V_2 = \frac{0{,}2968 \cdot 668{,}17}{750} = 0{,}2640$

$W = \frac{P_1\, V_1 - P_2\, V_2}{n-1} = \frac{1500 \cdot 0{,}1484 - 750 \cdot 0{,}2640}{1{,}2-1} = 123J$

p-V diagram:



Oppgave 3

N=1,4

P_1 = 0,1MPa ⟶ P_1 = 100 lepa

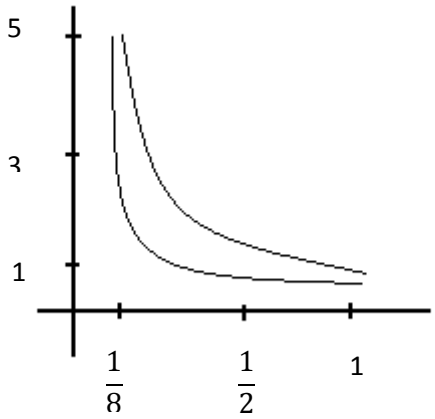
P_2 = 4,8MPa ⟶ P_2 = 4800 lepa

V_1 = 1l ⟶ 0,0001m^3

$V_2 = \frac{1}{8}l$ ⟶ 0,0000125m^3

Jeg antar at det er ideel gass.

p-V diagram:



$P_{v1}\ T_1^{\,n} = P_{v2}\ T_2^{\,n}$

$P_3 = \frac{P_1 V_1^{\,n}}{V_2} = \frac{100 \cdot 0{,}0001^{1,4}}{0.0000125^{1,4}} =$ <u>1837,9 kPa</u>

$P_n = \frac{P_2 \cdot V_2}{n-1} = \frac{4800 \cdot 0{,}0000125^{1,4}}{0.001^{1,4}} =$ <u>261,2 kPa</u>

$W = \frac{P_1 s \cdot V_1 - P_2 \cdot V_2}{n-1} = W_1 = \frac{P_1 s \cdot V_1 - P_3 \cdot V_2}{n-1}$

$W_1 = \frac{100 \cdot 0{,}001 - 1337{,}9 \cdot 0{,}0000125}{1{,}4-1} =$ <u>-0,324 kJ</u>

$W_2 = \frac{4800 \cdot 0{,}0000125 - 261{,}2 \cdot 0{,}001}{1{,}4-1} =$ <u>0,846 kJ</u>

$P = \frac{0{,}847-0{,}324}{60} =$ <u>26,15kW</u>