

Name: _____

A vapor compression refrigeration cycle is used with R-134a working fluid. Use the R-134a table in the appendix of your book for all calculations. Use reasonable assumptions for a typical vapor compression cycle to complete the calculations. However, in this case, there will be a pressure drop in the condenser (usually we assume the condenser is constant P) so that $P_4 = 1400 \text{ kPa}$. The thermal efficiency, η , of the compressor is 75% and the heat load on the evaporator ($\dot{Q}_{\text{evap}}$) is one ton of refrigeration (1 ton = 3.5 kW).

A. 51 points

Fill in the missing numbers in the following table using the numbering sequence given in the figure (each empty box is worth 3 points):

	Point 1	Point 2	Point 3	Point 4' (base case)	Point 4
T (°C)	48	-10			
P (kPa)				1400	1400
H (kJ/kg)					
S (kJ/kg-°K)					
x (vapor fraction)					

B. 17 points

Find the flowrate, $\dot{m}$ of the R-134a

$\dot{m} = \underline{\hspace{2cm}}$ kg/s

C. 16 points

Find the work requirement for the compressor in kW.

$\dot{W}_s = \underline{\hspace{2cm}}$ kW

D. 16 points

Find $\dot{Q}_{\text{cond}}$ in kW.

$\dot{Q}_{\text{cond}} = \underline{\hspace{2cm}}$ kW

