	PROBLEM T3			10 Points total	
A1			0.2		
	Correctly uses Ampere circuital law	0.1			
	Writes correctly in terms of required variables	0.1			
A2	Recognize EMF are opposite (no resistance)	0.2	0.6		
	Correctly uses Faraday law	0.3			
	Corect expression for work	0.1			
ALT:	**IF STUDENT KNOWS ANSWER ALREADY HdB**	**0.6**			
A3	Differentiate relation	0.1	0.2		
	Substitute and get correct answer	0.1			
B1	Correctly states energy conservation with heat	0.3	1.5		
	Recognize that at constant M the internal energy depends only on T	0.3			
	Correctly understand isothermal relation between heat and magnetization	0.3			
	Relate heat to change in H	0.2			
	Correctly get Q	0.4			
B2	Correctly understand adiabatic process (no heat exchange)	0.5	1.5		
	Correctly get differentail realtion between dT and dM	0.3			
	Separate variables correctly	0.1			
	Integrate correctly	0.3			
	Algebra done correctly	0.3			
C1	Correctly label temperatures on graph	0.1	0.2		
	Specify heat flow portions in diagram	0.1			
C2	Correctly use conservation of energy (from previous work) to	0.4	1.5		
	find heat with correct sign (0.2 each)				
	Identify correctly the temperatures of the vertices (0.1 each)	0.4			
	Use Carnot's relation to set up algebra	0.3			
	Simplify using equation of state	0.3			
	Get to correct final expression	0.1			

C3	Equate change of energy of gas to heat	0.1	0.8		
	Use density and volume to calculate mass	0.1			
	Use heat relation to material refrigerator	0.2			
	Correctly calculate with physical parameters	0.15			
	Give numerical value of final temperature which is within 0.001	0.2			
	units correct	0.05			
C4	Write Carnot's equation in differential form (because non-linear)	0.4	2.0		
	Relation of power to work	0.3			
	Relate dQ to dT in magnetic material (sign is importantt)	0.4			
	Separate variables	0.3			
	Integrate with limits correctly	0.3			
	Final expression with logs	0.3			
C5	Relate total work with Power and time	0.2	1.5		
	Relate total heat with the temperature change for Helium	0.2			
	Replace in the fornula for time of previous part	0.6			
	Use definition of COP properly	0.3			
	Get correct final expression	0.2			