

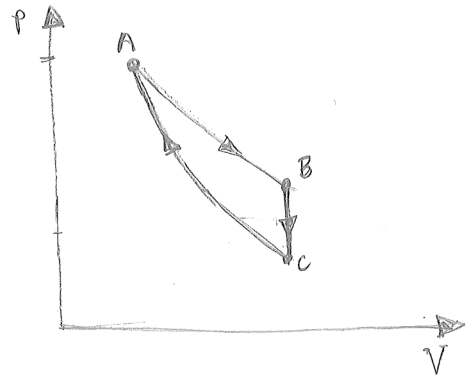
Physics 161 Fall 2010 Exam 2

Numbers will be changed on the real exam.

Closed book closed notes calculators OK.

Temperatures in Kelvin, heats / energies are in J, entropies in J/K

A monatomic ideal gas is taken around the reversible cycle shown. *One segment is isothermal; one is adiabatic; one is isochoric.*



	A	B	C
P	1000 N/m <sup>2</sup>		
V	1 m <sup>3</sup>	2	
T	1000 K		

1&2. What is the work done *by* the gas on path AB?  x 10

3&4. What is the volume of the gas at C (in m<sup>3</sup>)?  x 10

5&6. What is the heat removed from the gas on path BC?  x 10

7&8. What is the work done *on* the gas on path CA?  x 10

9] This is an (A) engine or (B) refrigerator.

10&11] What is the efficiency, in %?

Substance P melts at 200K. The latent heat of fusion is 120 J/g.

20 g of substance P is immersed in a very large oil bath at 300K.

12&13. What is the increase in entropy (J/K) of substance P when it has melted, but is still at 200K?

14&15. What is the magnitude of the decrease in entropy in the oil bath? You may assume that the change in temperature of the oil bath is negligible.

16. This process is thermodynamically

A] reversible

B] irreversible

C] cannot determine

17. A finite (not infinitesimal) test charge is brought near a neutral, insulating sphere. The electric force on the charge is

A] zero

B] weakly repulsive

C] weakly attractive

D] strongly repulsive

E] strongly attractive

18&19. The electric force on a test charge P caused by point charge Q1 alone is 36 N. What is the magnitude of the total electric force (in N) when Q2 is added at the point shown?

**Note: on the real exam, these charges may not be on the axes! You need to take components.**

