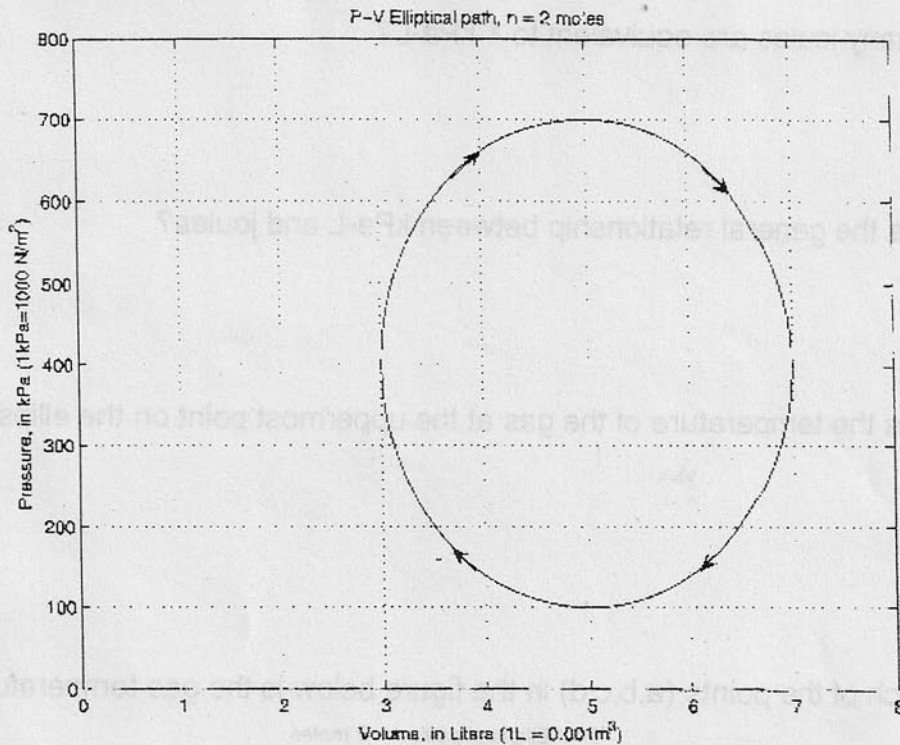


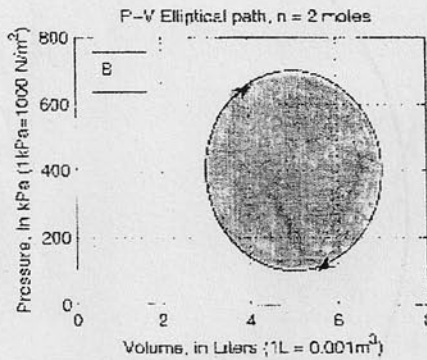
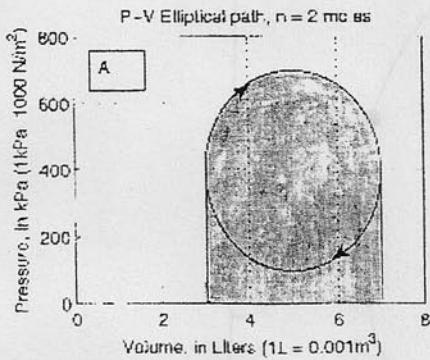
Ideal gas worksheet

Name: _____

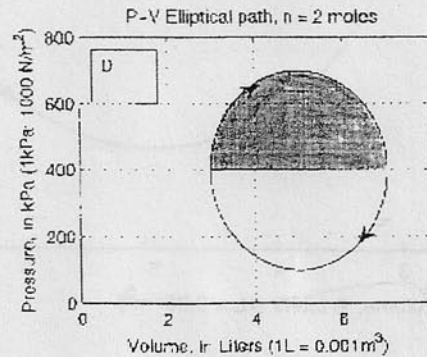
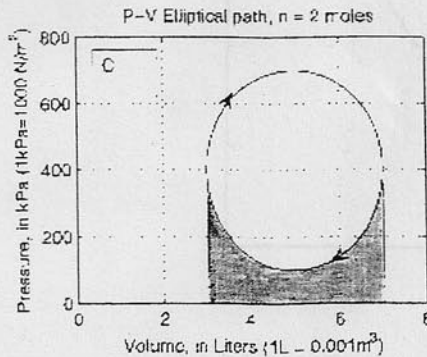
The figure below shows the P-V diagram for **two** moles of an ideal monatomic gas that expands and contracts along an elliptical path.



Questions 1-3: The above figure is redrawn below with four different shaded regions.



Q1: Which shaded region (A, B, C, D) represents the work done by the gas as it expands from 3L to 7L?



Q2: Which shaded region (A, B, C, D) represents the work done by the gas as it contracts from 7L to 3L?

Q3: Which shaded region (A, B, C, D) represents the work done by the gas as it completes one cycle?

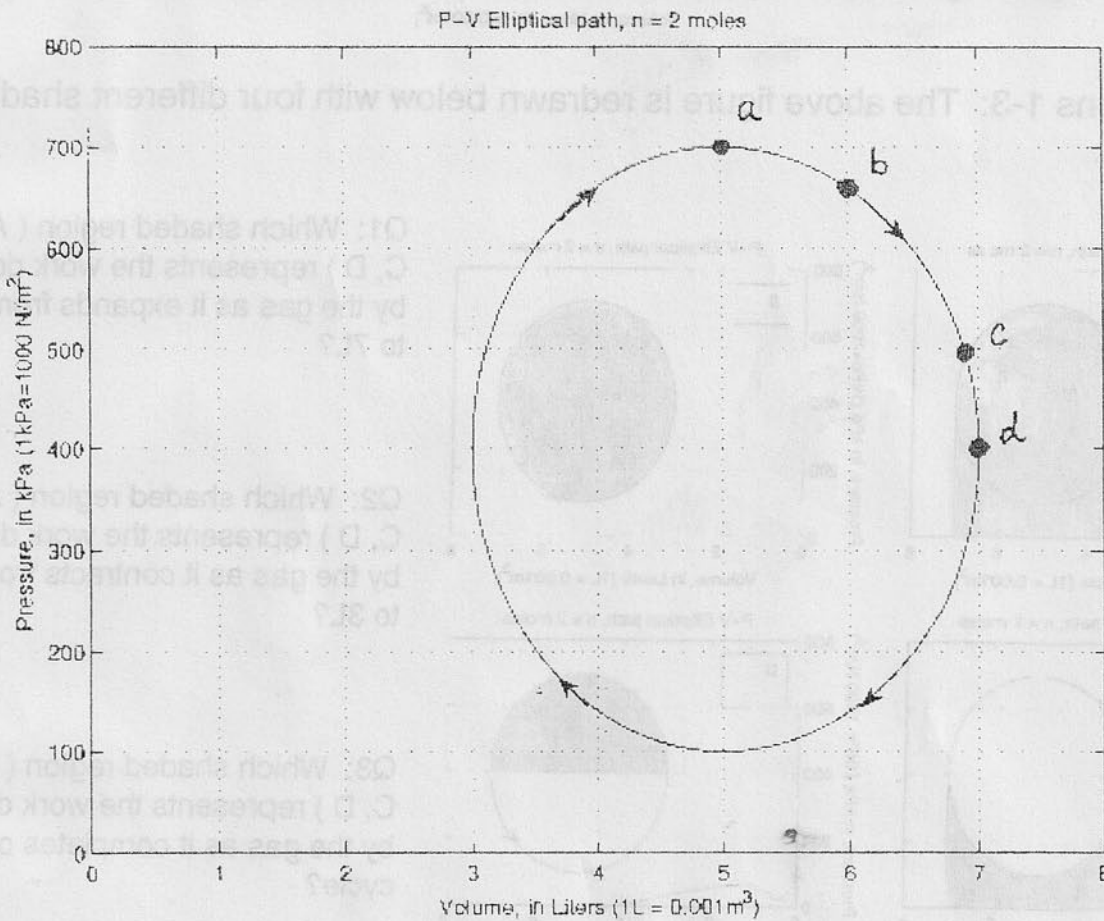
Q4: How many joules are equivalent to 100 kPa-L?

Q5: How many joules are equivalent to 1 kPa-L?

Q6: What is the general relationship between kPa-L and joules?

Q7: What is the temperature of the gas at the uppermost point on the ellipse?

Q8: At which of the points (a,b,c,d) in the figure below is the gas temperature the highest?



Q9: The general equation for an ellipse in P-V space has the form:

$$\left(\frac{P - \alpha}{\beta}\right)^2 + \left(\frac{V - \chi}{\delta}\right)^2 = 1$$

What are the values of α, β, χ and δ that describe the ellipse illustrated in the figures?

Q10: Using the results of Q9, write down an equation for P vs. V that describes the path illustrated *while the gas expands*.

Q11: Using the results of Q9, write down an equation for P vs. V that describes the path illustrated *while the gas contracts*.

Q12: Compute the work done by the gas as it expands from 3L to 7L.

Q13: Compute the work done by the gas as it contracts from 7L to 3L.

$$1 = \frac{V - X}{b} + \left(\frac{P - a}{b} \right)$$

What are the values of a , b , x and y that describe the ellipse illustrated in the figure?

Q10: Using the results of Q9, write down an equation for P vs. V that describes the path illustrated while the gas expands.

Q14: Compute the work done by the gas as it completes one full cycle.

Q11: Using the results of Q9, write down an equation for P vs. V that describes the path illustrated while the gas contracts.

Q12: Compute the work done by the gas as it expands from 3L to 7L.