

## AP Physics: Short Lab 12-B

### Isothermal Processes

Name \_\_\_\_\_ Hour \_\_\_\_\_

Lab Partners \_\_\_\_\_

#### Purpose:

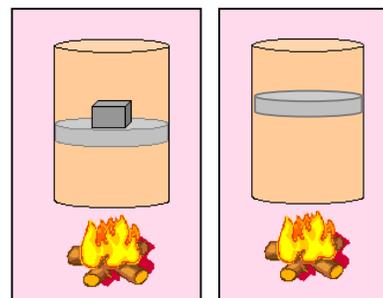
Analyze relationships between work, heat, and internal energy occurring in isothermal processes.

#### Equipment:

- Interactive Physics computer software

#### Procedures: Isothermal Processes

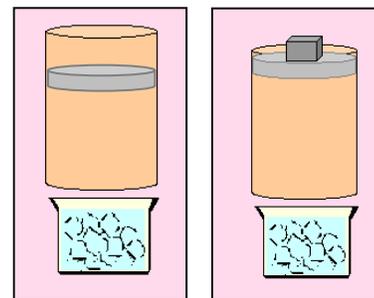
1. Open the Interactive Physics file “*Isothermal (I-A)*”. The simulation shows a cylinder with a movable piston containing an ideal gas. The cylinder is originally in contact with a hot reservoir and a mass is located on the piston. The mass is then removed, while the cylinder remains in contact with the hot reservoir. Run the simulation and observe the measurements of the gas and the Pressure-Volume graph produced. Use the 1<sup>st</sup> Law of Thermodynamics to predict the signs (positive, negative, or zero) of the quantities below for this process:



Work: \_\_\_\_\_ Heat: \_\_\_\_\_  $\Delta$  Internal Energy: \_\_\_\_\_

2. Open the Interactive Physics file “*Isothermal (I-B)*”. The simulation shows the same situation as “*Isothermal (I-A)*,” with the addition of the amounts and signs of work, heat, and change in internal energy as the process is completed. Run the simulation and use the data to check your predictions from Question #1. Were any of your predictions incorrect? If so, what clues could you use to determine the correct answer next time?

1. Open the Interactive Physics file “*Isothermal (II-A)*”. The simulation shows a cylinder with a movable piston containing an ideal gas. The cylinder is originally in contact with a cold reservoir. A mass is then added to the piston, while the cylinder remains in contact with the cold reservoir. Run the simulation and observe the measurements of the gas and the Pressure-Volume graph produced. Use the 1<sup>st</sup> Law of Thermodynamics to predict the signs (positive, negative, or zero) of the quantities below for this process:



Work: \_\_\_\_\_ Heat: \_\_\_\_\_  $\Delta$  Internal Energy: \_\_\_\_\_

2. Open the Interactive Physics file “*Isothermal (II-B)*”. The simulation shows the same situation as “*Isothermal (II-A)*,” with the addition of the amounts and signs of work, heat, and change in internal energy as the process is completed. Run the simulation and use the data to check your predictions from Question #1. Were any of your predictions incorrect? If so, what clues could you use to determine the correct answer next time?