

Name _____
Honors Physics
Period _____

Date _____
Thermodynamics WS #3H
Mrs. Nadworny

1st Law of Thermodynamics

Directions: Read online textbook pages 360 – 363 and 371 - 375. Solve the following problems using the GUESS method and proper significant figures. Be sure to show ALL work.

- 24 Joules of heat are added to a gas container, and then the gas does 6 Joules of work on the walls of the container. What is the change in internal energy of the gas?
(A) - 30 J (B) - 18 J (C) 18 J (D) 30 J
- The internal energy of a system increased by 982 joules when it absorbed 492 joules of heat.
 - Calculate the amount of work done.

$$\Delta U = Q + W$$

$$W = \Delta U - Q = 982\text{J} - 492\text{J} = 490.\text{J}$$

- Was the work done on or by the system?

Work was done ON the system, because the work was positive

- A gas in a cylinder was placed in a heater and gained 5500. J of heat. The cylinder increased in volume from 345 mL to 1846 mL by the gas doing 150 J work on the environment.
 - Calculate the change in internal energy of the gas in the cylinder.

$$\Delta U = Q + W = 5500.\text{J} + (-150\text{J}) = 5350\text{J}$$

- Did the system increase or decrease its internal energy?

The system increased its internal energy, because the delta U was positive

- The change in internal energy for the combustion of 1 mole of methane gas in a cylinder is -892.4 kJ. A piston connected to the cylinder performs 492 kJ of expansion work due to the combustion.
 - Calculate the amount of heat transferred.

$$\Delta U = Q + W$$

$$Q = \Delta U - W = -892.4\text{kJ} - (-492\text{kJ}) = -400.\text{kJ}$$

- Was the heat gained or lost by the system?

Heat was lost by the system, because the heat was negative

Answers in size order: 400., 490., 5350