Physics 240: Unquiz 8	Name:_____

A material has a coefficient of linear expansion given by $\alpha = 1 \times 10^{-4}/^{\circ}C$. The same material has a specific heat of 1500 J/kg C. Suppose 1 kg of this material (with a volume of 0.04 m^3 is heated from 0C to 100C. It is surrounded by the atmosphere which has a pressure of 1.01×10^5 Pa.

(a) Calculate Q

(b) Calculate W

(c) Calculate ΔU

An ideal gas goes through an isothermal process at T=100C.

(d) Calculate ΔU

An ideal gas goes through an isobaric process at $P = 1 \times 10^5$ Pa and changes volume from 1 m^3 to 2 m^3.

(e) Calculate W

Physics 240: Unquiz 8	Name:_____

A material has a coefficient of linear expansion given by $\alpha = 1 \text{x} 10^{-4}/^{\circ}\text{C}$. The same material has a specific heat of 1500 J/kg C. Suppose 1 kg of this material (with a volume of 0.04 m^3 is heated from 0C to 100C. It is surrounded by the atmosphere which has a pressure of 1.01x10 ^{5} Pa.

(a) Calculate Q

$Q = mc\Delta T = 1\,\text{kg} \text{x} 1500\,\text{J/KgC} \text{x} 100\,\text{C} = 1.5\text{x}10^5\,\text{J}$

(b) Calculate W

$W = P\Delta V = 3 * 1.01\text{x}10^5 \text{x}\, 0.04 * 100 = 121\,\text{J}$

(c) Calculate ΔU

$\Delta U = Q - W \approx 1.5\text{x}10^5\,\text{J}$

An ideal gas goes through an isothermal process at T=100C.

(d) Calculate ΔU

$\Delta U = 0$

An ideal gas goes through an isobaric process at P=1x10^5 Pa and changes volume from 1 m^3 to 2 m^3.

(e) Calculate W

$W = P\Delta V = 1\text{x}10^5(2) = 2\text{x}10^5\,\text{J}$