**Thermo: Quiz 3a**

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1. A gas is kept in a cylinder that can be compressed by pushing down on a piston. You add 2500 J of heat to the system, and then push the piston 1.0 m down with a constant force of 1800 N. What is the change in the gases internal energy?
2. A small heat engine operates using a pan of 1000C boiling water as the high temperature reservoir and the atmosphere as a low temperature reservoir. Assuming ideal behavior, how much more efficient is the engine on a cold, 00C day than on a warm 200C day?
   1. just as efficient
   2. 1.25 times as efficient
   3. 2.00 times as efficient
   4. 20.0 times as efficient
   5. infinitely more efficient
3. A gas is enclosed in a metal container with a moveable piston on top. Heat is added to the gas by placing a candle flame in contact with the container’s bottom. Which of the following is true about the temperature of the gas? ***INCLUDE AN EXPLANATION OF YOUR CHOICE!***
   1. *The temperature must go up if the piston remains stationary.*
   2. *The temperature must go up if the piston is pulled out dramatically.*
   3. *The temperature must go up no matter what happens to the piston.*
   4. *The temperature must go down no matter what happens to the piston.*
   5. *The temperature must go down if the piston is compressed dramatically.*

Answers:

1. Q = + 2500 J

Pushing down on the piston = work done ON the gas and therefore is +



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 = 100/80 = 1.25

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*1st Law of Thermodynamics! The candle heats up the gas, so Q is + and ΔU is +. ΔU is directly related to temperature so it also increases. If the piston moves then work could be done on or by the system changing ΔU.*