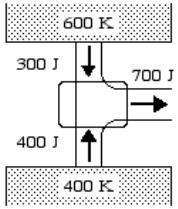
Pretest (SLT) *University of Colorado. Boulder*

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **just heat transfer, no work**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **zero**
Explain: **same**

The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **same**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **it doesn't make sense**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **same**

Could this device possibly function?**no**
Explain: **violates laws of thermodynamics.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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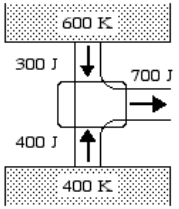

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Since there would be an increase in the internal energy, the work would be positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat is going into the substance, so the heat transfer is positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Even though the heat is small, the heat transfer would be positive.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **There is heat transfer and work is occurring.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **The energy balances out. Thus, energy is conserved.**

Could this device possibly function?**yes**
Explain: **It agrees with the laws of thermodynamics so yes.**

END OF RESPONSE

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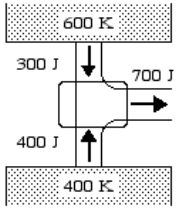

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Work in same direction of displacement? There is displacement of the fluid against the surroundings.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **increasing the temp of the material**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Adding heat increases internal energy, which prompts the fluid to expand and therefore is positive**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **the change in internal energy is the heat added minus the work done**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **the drawing makes it look like here is 100% efficiency which is impossible.**

Could this device possibly function?**yes**
Explain: **I think so**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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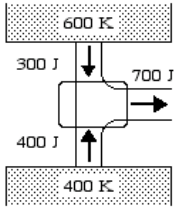


Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **because the gas is going opposite the force.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **I dont know**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **???**

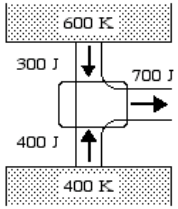
Would this device satisfy the first law of thermodynamics? **yes**
Explain. **the heat transfer minus the work done is still conserved.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Entropy**

Could this device possibly function?**yes**
Explain: **Because both laws are satisfied**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **The substance is doing work.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat is powering the device.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The arrows indicate this.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Work is going out, heat is coming in.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The starting conditions represent lower order than the ending conditions would.**

Could this device possibly function?**no**
Explain: **A heat engine is a one directional process.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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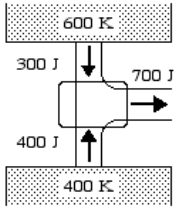

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **due to cross product relationship, work will be positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **working substance operating at lower temperature than reservoirs.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **working substance at same temp as lower temp reservoir**

Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain. **can't tell whether change in internal energy equals heat added to the system minus work done by the system.**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **not enough information to tell whether entropy increases with time.**

Could this device possibly function?**not enough information is given**
Explain: **can't tell whether laws of thermo. are satisfied**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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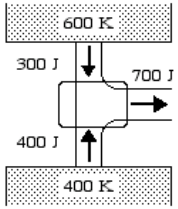

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **the 700 J goes out of the system**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **it aquires 300 J from it**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **it does 700 J of work and recieves 700 J of heat**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **all the heat gained goes to work**

Could this device possibly function?**no**
Explain: **it doesnt give heat to the cold resevoir**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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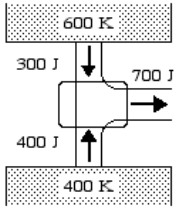

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **If it is work done and not heat transfered, then the work done by the resivoirs on the substance would be positive casue the force and direction of displacement are in the same direction.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat is traveling from the resevoirs to the substance, making the substance have a positive heat transfer.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **I'm assuming the material starts at a tempurature below that of both resevoirs, so the transfer would be positive.**

Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain. **We dont know if work is being done or just heat is being transfered.**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **I dont know.**

Could this device possibly function?**not enough information is given**
Explain: **We dont know if work is being done or heat is being transfered.**

END OF RESPONSE

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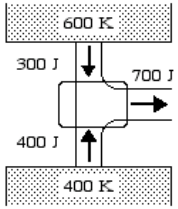

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **More energy is flowing from the lower tempurature reservoir.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Work is in the direction of displacement**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Work is in the direction of displacement**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Heat flows from high temp to low**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **not enough info**

Could this device possibly function?**yes**
Explain: **the device doesnt retain any of the heat**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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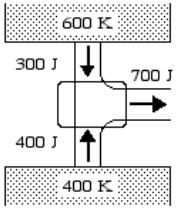

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Same directions**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Opposite directions**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Opposite directions**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Heat goes to equilibrium**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Heat can't go from low resovoir to high**

Could this device possibly function?**no**
Explain: **Defies the 2nd law**

END OF RESPONSE

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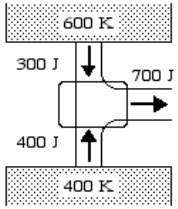

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **it looks lie the two oposing directions of heat flow will cancel so that leaves just one arrow pointing in one direction so it's either positive or negative, but I'm going with positive**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **well it will definately lose heat to the colder substance, whter this means it's positive or negative heat I'm not sure**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **this should be the same as number 6. even though the resivour is colder it will still transfer heat.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **it appears that all the heat from the lower resivour is transferred as energy. I don't think that would be possible**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **sure the energy here is a funtion of state variables**

Could this device possibly function?**yes**
Explain: **maybe if we increased the effifiency of the top resivour, and allowed the bottom to be less than 100% transferrable, then we'd have a functioning device.**

END OF RESPONSE

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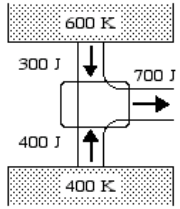

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **it would be positive because the work in the verticle is greater in the upward direction and the work in the horizontal direction is all to the right making it positive as well**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **heat is flowing out of the place of higher temp**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **the heat outside of the low temperature resevoir is the same as the low temp resevoir**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **the amount of energy that it gives out is equivelent to that which is put in**

Would this device satisfy the second law of thermodynamics? **unanswered**
Explain:

Could this device possibly function?**unanswered**
Explain:

END OF RESPONSE

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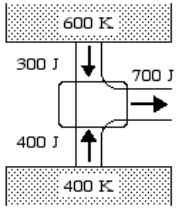

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **It would be positive because its work on the substance.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Yes, because energy is being conserved when it is transferred to the substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It would be the same reason as Question 7.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Yes, because the total energy of the system is equal to the heat given to the substance.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Not all of the heat will be perfectly transferred. There will be some energy lost.**

Could this device possibly function?**yes**
Explain: **It can function, however it probably won't be 100% efficient.**

END OF RESPONSE

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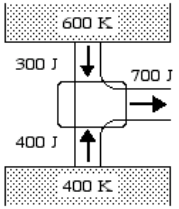

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **Work is the change in the energy and since the energy coming in is the same as the energy coming out, the work done on the working substance is zero**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Energy is being transferred to the working substance, so the heat is being transferred to the substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Energy is being transferred to the working substance, so the heat is being transferred to the substance.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **There is work but no change in volume, which are two of the things required for the first law.**

Would this device satisfy the second law of thermodynamics? **999**
Explain:

Could this device possibly function?**no**
Explain: **It does not satisfy the first law, which means that the device cannot run.**

END OF RESPONSE

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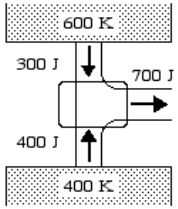

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **The system does positive work on it's surroundings, so the work done on the system is negative**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Energy flows into the system**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Energy flows into the system**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The internal energy change of the system is the heat entering the system minus the work leaving the system**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **not all of the heat energy entered into the system can be converted to work**

Could this device possibly function?**no**
Explain: **it does not satisfy the second law of thermodynamics**

END OF RESPONSE

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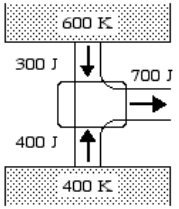

Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **increasing heat**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **energy is not being created or destroyed**

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**yes**
Explain:

END OF RESPONSE

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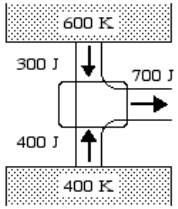

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **When the substances reach an equilibrium state that exists in the positive direction a positive amount of work is done.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The high temperature reservoir is losing heat during the whole process so it is negative.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Because the low heat is gaining heat in the final outcome, the transfer in thus positive.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **By adding two temperatures the outcome is not the summation of the two temperatures, rather it is an equilibrium which is not depicted by the graph.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Even though there is a heat transfer the heat transfer is not done in maintaining the energy of the systems. Therefore, the second law of thermodynamics is not followed.**

Could this device possibly function?**no**
Explain: **Since is does not follow the first law of thermodynamics, already it seems that the system cannot exist, which is very true. The system must maintain equillibrium and not at energy from heat transfers.**

END OF RESPONSE

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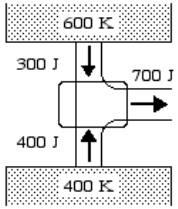

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **the reservoirs don't have the same capacity**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **heat is work times delta U, so since work is positive, so is heat**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **same reason as above, except it's negative**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **there is a temp. change**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **work varies as well as tempe.**

Could this device possibly function?**yes**
Explain: **the reservoirs provide enough work**

END OF RESPONSE

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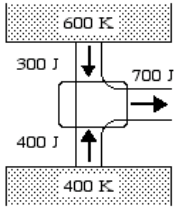


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Both the heat transfer and volume change. works = P delta V.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **since the high temperature reservoir changed from higher to lower temperature, the change is negative. Q=mc deltaT, since delta T is negative, Q is negative.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **since the low temperature reservoir changed from lower to higher temperature, the change is +. Q=mc deltaT, since delta T is +, Q is +.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **There is heat transfer and temperature is measured by a thermometer.**

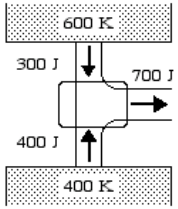
Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **we don't know how the entropy is related in this problem**

Could this device possibly function?**not enough information is given**
Explain: **Since we don't know if it satisfies the second law of thermodynamics.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Force is in direction of dispalcement.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **It is opposite of work.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **The two above cancel.**

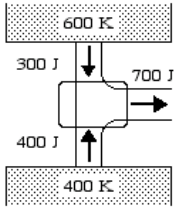
Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain. **I need to know how many widgets exist.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Honestly c'mon guys.**

Could this device possibly function?**yes**
Explain: **DOOD THE B TREES SAY NUUUUUU!**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **because that the heat is positive, and the work on system should be negative to keep the internal energy the same.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **because is heat transfered out from the system, so the heat would be negative and make the work positive**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **because the heat is positive and the work would be like negative.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**no**
Explain:

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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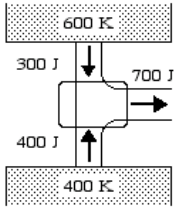


Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **It is a Dot product and the cos of 90 deg is zero so zero times the displacement is zero.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **It is tranfing heat and when you do that it is postive**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It is heating up and making positve work**

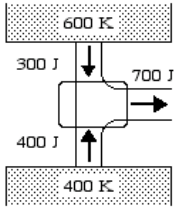
Would this device satisfy the first law of thermodynamics? **unanswered**
Explain.

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **it just does**

Could this device possibly function?**no**
Explain: **The work energy therom doesn't work in this siduaton**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Force is in the same direction as displacement.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Loses heat.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Gains heat.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Accurately fits the PV=nRT equation.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **The second law can be accurately represented through this scenario.**

Could this device possibly function?**yes**
Explain: **It is possible because it satisfies both of the laws of thermodynamics.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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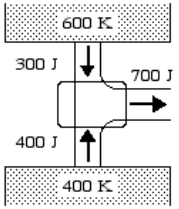


Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain:

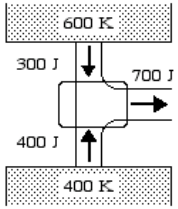
Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **no**
Explain:

Could this device possibly function?**no**
Explain:

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **The force is not in the same direction as displacement. The work is going to the right, perpendicular to the input of energy.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat is entering the working substance, so Q is positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Heat is flowing into the working substance from the low temperature resevoir, so Q of the working substance due to the low temp resevoir is positive.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The internal energy of the working substance is the amount of heat added minus the amount of work done.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Heat should not be transferred from the cold temp resevoir to the working substance because the working substace should be hotter than the cold temp resevoir based on information given.**

Could this device possibly function?**yes**
Explain: **?**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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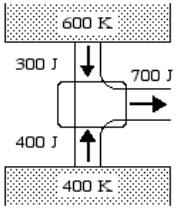


Q1: The work done on the working substance during each cycle would be; **not enough information is given**
Explain : **Heat change doesn't change work.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **I looked at the arrows. Could I be misreading the diagram?**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Again, I looked at the arrows.**

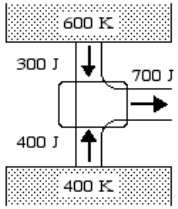
Would this device satisfy the first law of thermodynamics? **no**
Explain. **It doesn't really allow for anything to be replaced.**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **You should tell the second law of thermodynamics.**

Could this device possibly function?**no**
Explain: **If I answered 'no' to question eleven or to question twelve, then it would not be possible.**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Its temp increases**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **the working substance gains heat**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **it gains heat**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **the heat of the substance cant be greater than the other substances**

Would this device satisfy the second law of thermodynamics? **no**
Explain:

Could this device possibly function?**no**
Explain: **it doesnt satisfy the laws of thermodynamics**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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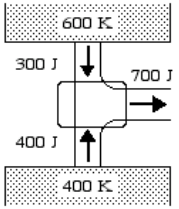


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The reservoirs do positive work of 400 J and 300 J.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The reservoirs are at a higher temperature so they lose heat energy while heating the working substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The low temp reservoir would absorb the heat energy from the working substance.**

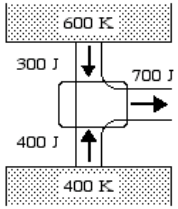
Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**yes**
Explain: **If the working substance absorbs and translates the energy to the right, then it would work.**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **no external force.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **High temp= more work (pos)**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **not enough information is given**
Explain: **less work than the higher temp but it could be positive as well.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The increase of energy is equal to the amount of energy added by heating the system, minus the amount lost as a result of the work done by the system on its surroundings.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Heat cannot of itself pass from a colder to a hotter body.. it is going from hot to cold.**

Could this device possibly function?**yes**
Explain: **The system satifies both thermodynamic laws.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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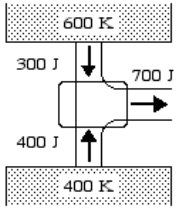

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **The gas is moving in a direction perpendicular to the force, which will create 0 work.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The higher temperature gas is mixing with a lower temperature gas, so the equilibrium will be 0**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **See the previous question, but opposite.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **No idea**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **No idea**

Could this device possibly function?**no**
Explain: **The parts do not sum up**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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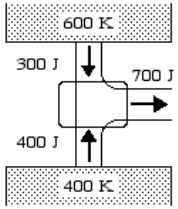


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **energy enters the substance**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **heat transfers from hot to cold**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain:

Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain. **I dont understand the question**

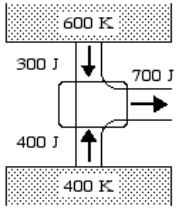
Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **I dont understand the question**

Could this device possibly function?**no**
Explain: **I dont think so, more heat is comming from the colder side.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **700J is work done on the substance while it outputs 700J so there is no net heat transfer so there is no work.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The both transfer heat energy to the substance os delta-heat is positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The both transfer heat energy to the substance os delta-heat is positive.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The net change in heat all works out to equal zero in the diagram.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The net entropy of the system remains the same or decreases in the device.**

Could this device possibly function?**no**
Explain: **For the device to remove energy from both substances and transfer it elsewhere the entropy of the system would decrease.**

END OF RESPONSE

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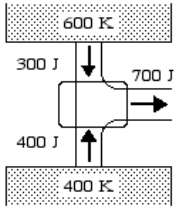

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **some of the heat has to come from somewhere besides transfer because the exit temp is higher than the highest reservoir.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **It is less than the final temp.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **It is less than the final temp.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Some heat is gained from work and some through transfer.**

Would this device satisfy the second law of thermodynamics? **unanswered**
Explain: **I don't know**

Could this device possibly function?**yes**
Explain: **With enough work the heat can be generated above the reservoir's**

END OF RESPONSE

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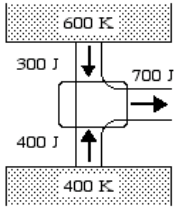

Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **zero**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **no**
Explain:

Could this device possibly function?**yes**
Explain:

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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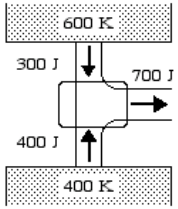

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Because the arrow for work is moving in the direction of displacement**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Positive, because all things equal, the heat from the hot reservoirs is moving toward the colder object**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **the low temp reservoir is losing heat**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Yes because heat minus work is delta u**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **yes, but only if the work is not mechanical work**

Could this device possibly function?**yes**
Explain: **yes but only if the work done is not mechanical work**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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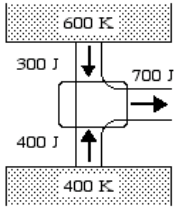


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The work is positive because the working substance is loosing heat**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The high temperature reservoir is giving off heat to the working substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **The working substance is warmer and therefore the heat transferred to the working substance is negative.**

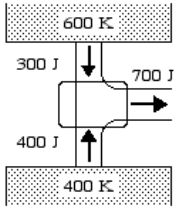
Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Heat Transfer**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Heat Transfer**

Could this device possibly function?**no**
Explain: **Doesn't make sense**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **not enough information is given**
Explain : **This question depends on the substance. We do not know whether the substance's volume will change with increased heat.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Since heat transfers from hot to cold, the higher temperature reservoir will transfer heat to the substance (+), and heat will not be transferred to the reservoir (-).**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Since heat transfers from hot to cold, the higher temperature reservoir will transfer heat to the substance (+), and heat will not be transferred to the reservoir (-).**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The internal energy of the system is a function of its state variables. (Read: I have no clue.)**

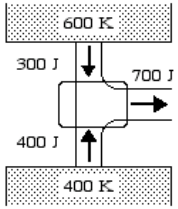
Would this device satisfy the second law of thermodynamics? **unanswered**
Explain: **I do not know the second law of thermodynamics.**

Could this device possibly function?**unanswered**
Explain: **Well, if it satisfies the above laws, it could function. If not, it could not function.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **they add together to equal 700**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **temp down**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **temp up**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **change u = Q - w**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **impossible to convert 100 of the energy**

Could this device possibly function?**yes**
Explain: **passes both laws**

END OF RESPONSE

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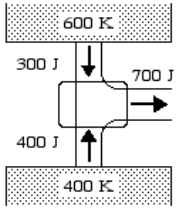

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **The work is not in the direction of motion so it does not get taken into account.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **There will always still remain some heat in the block so it will always be positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **This block can give away all its heat so it becomes negative.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Heat is transfered to balance the equilibrium.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Yes this does satisfy the second law of thermodynamics because the heat is all still present just in different forms.**

Could this device possibly function?**yes**
Explain: **Energy is not being created nor destroyed so that all of the functions would theoretically work.**

END OF RESPONSE

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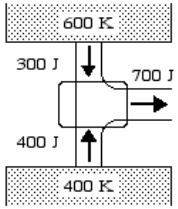


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **because there is a positive heat gain**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **because the heat flows from the reservoir to the substance**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **because the heat flows from the working substance to the reservoir**

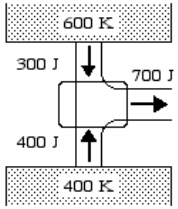
Would this device satisfy the first law of thermodynamics? **unanswered**
Explain. **N/A**

Would this device satisfy the second law of thermodynamics? **unanswered**
Explain: **N/A**

Could this device possibly function?**unanswered**
Explain: **N/A**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **it loses as much as it gains**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **heat is flowing from the res. to the subtance**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **same as previous**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **enrgy seems to be conserved**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **there is nothing supplying energy to to the device to "move" the heat**

Could this device possibly function?**no**
Explain: **2nd law not obeyed**

END OF RESPONSE

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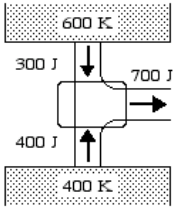

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **perpendicular**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**yes**
Explain:

END OF RESPONSE

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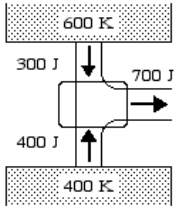

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **W=Qh-Qc**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **heat is positive when it is transferred into the working substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Heat pulled from a working substance is negative.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **because Q=W**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **By the second law, nothing can convert all the heat it is given into only mechanical energy, as it does with the 400 K reservoir.**

Could this device possibly function?**no**
Explain: **It violates the second law of thermodynamics.**

END OF RESPONSE

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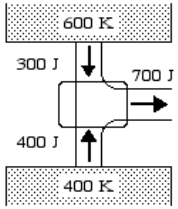

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **The gas is increasing in volume so is doing positive work**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The gas is at a lower temp. initially, so will gain heat until in equilibrium**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **It's at the same temp. as the gas so it's already at equilibrium**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **It would eventually come to thermal equilibrium and have the same temp as the reservoirs**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Energy is becoming less condensed so entropy is increasing**

Could this device possibly function?**not enough information is given**
Explain: **We need to know which arrows represent working being done and which are heat transfer.**

END OF RESPONSE

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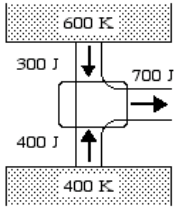

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **There must be some force pushing the substance out of each reservoir and this woud=ld also be in the direction of displacement. Therefore, work is postive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **If heat is transfered out of each reservoir then heat transfer is negative for the substances= and positive for the working substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **There is heat escaping from the reservoir so the working substance must be gaining heat.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Heat is lost and work is done. The energt inside of them would hange acordingly.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Heat transfer is conserved.**

Could this device possibly function?**yes**
Explain: **Heat transfer is conserved but after sometime the device would stop functioning.**

END OF RESPONSE

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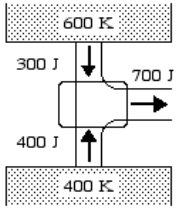

Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The heat is moving from a higher temperature to a lower temperature so the heat transferred is negative.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **Heat can be transferred from a colder temperature to a higher temperature according to the second law of thermodynamics.**

Would this device satisfy the first law of thermodynamics? **no**
Explain.

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Heat can't be transferred from the 400 K reservoir becasue of the second law of thermodynamics so this device does not satisfy this law.**

Could this device possibly function?**no**
Explain: **Since it does not satisfy both laws the decive can not function.**

END OF RESPONSE

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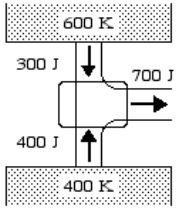

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Heat is being put into the system so work is produced.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat being added to the system will create an increase in temperature and therefor will have positive heat transfer.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The heat being added to the system will create an increase in temperature and therefor will have positive heat transfer. Even though the heat being added is less it will still have a positive heat transfer.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Change in Energy would be equal to heat transfer minus work. The equations of the first law would be satisfied because internal energy is dependent upon the state variables.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Heat will be outputted while work is done so the second law will be satisfied.**

Could this device possibly function?**yes**
Explain: **The device satisfies the first and second law of thermodynamics and could function.**

END OF RESPONSE

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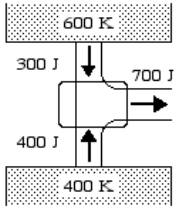

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **The work would be negative because the substance is doing positive work, which means the work done on the substance is negative.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The heat transfer is negative since heat flows from the warm body to the cold, thus the high temperature reservoir loses heat.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Positive since it gains heat.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Yes it satisfies the first law.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **It does not satisfy the second law of thermodynamics.**

Could this device possibly function?**no**
Explain: **No it can't because it violates a law of thermodynamics**

END OF RESPONSE

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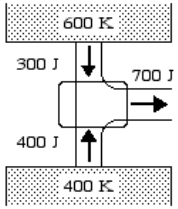

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Positive because the directions of the force and work are in the same direction**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **negative because it would decrease the temperature and give off heat**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **positive because it is giving the reservoir heat**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Yes because it doesnt violate any part of the law**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **yes because it also doesnt violate any part of that law either**

Could this device possibly function?**yes**
Explain: **Yes it could function but it wouldn't be of any use**

END OF RESPONSE

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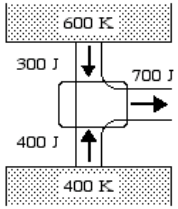

Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **unanswered**
Explain:

Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain.

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**no**
Explain:

END OF RESPONSE

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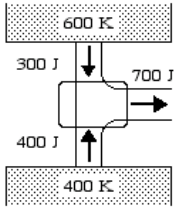

Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**yes**
Explain:

END OF RESPONSE

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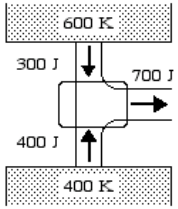

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **the same heat is going out as is coming in**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **999**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **it is putting heat into the system**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **it doesn't reach thermal equilibrium**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **all the heat is accounted for**

Could this device possibly function?**no**
Explain: **there is no work being done and the first law of thermodynamics doesn't apply**

END OF RESPONSE

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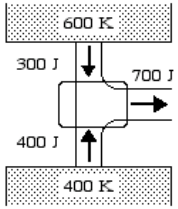

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **goes with direction of energy**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **resists heat transfer**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **goes with direction of energy**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **couldnt tell ya**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **dunno**

Could this device possibly function?**not enough information is given**
Explain: **i dont know**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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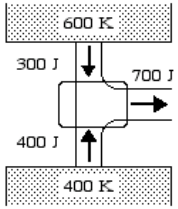

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **When energy is transfered and there is no change in volume then no work is done.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat going into a system from a higher temp resevior is always positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Heat transfered from a cooler resevior is always negative**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Some of the energy transfered into the system from the hotter resevior is transfered out to the cooler resevior.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Energy never flows from a cooler resevior to a hotter working substance.**

Could this device possibly function?**no**
Explain: **It doesnt follow the second law of thermodynamics.**

END OF RESPONSE

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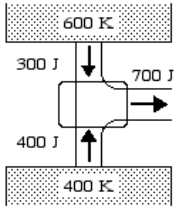

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Q of the substance is positive, so W is negative**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat flows into the substance in order for the device to function**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Heat flows to areas of lowest heat**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **U=Q-W**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **100% of the heat flows from the cooler reservoir**

Could this device possibly function?**no**
Explain: **Doesn't satisfy 2nd Law**

END OF RESPONSE

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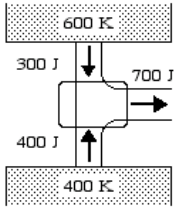


Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **work is being done on it**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **it is adding its heat to the working substance**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **its adding heat to the working substance**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **U=Q-W and W is negative so they add togther**

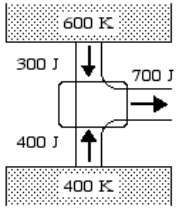
Would this device satisfy the second law of thermodynamics? **yes**
Explain: **it jsut does**

Could this device possibly function?**yes**
Explain: **the work that comes out is equal to the heat of the hot resavoir plus the heat of the cold resevoir.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **if energy goes into it then it will be +**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **zero**
Explain: **can heat be + or -?**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **not enough information is given**
Explain: **dont know**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **because work is added as heat is added Q-W**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **heat goes from the hot temp reservoirs to cold**

Could this device possibly function?**yes**
Explain: **both laws are satisfied(i think)**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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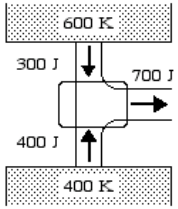

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **There would be a positive area under the pressure volume curve**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **if there is going to be heat transfered to a substance it is going to require positive work**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **if the last one is positive it would make sense that this one be negative**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **its a law so it must work with it**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **again it is a law so if it works then it must**

Could this device possibly function?**yes**
Explain: **it seems to follow the laws**

END OF RESPONSE

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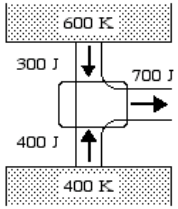

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Heat is transfered from the reservoirs to the substance.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Same reason as above.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Heat would be transfered into the reservoirs.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Because heat tranfer = Q-W**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Because heat cannot transfer from a cooler to a hotter body.**

Could this device possibly function?**no**
Explain: **It doesn't obey the second law.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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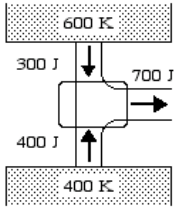

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Work is equal to the change in the internal energy of the system and the internal energy is increasing as heat is added, so the work done is positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat transferred to the working substance would be positive because it is endothermic.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It would not transfer as much heat as the heat transferred from the high temperature reservoir but it would still be positive because its putting heat into the system.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **It satisfies the first law of thermodynamics because more heat is added to the system than the system does work and so the internal energy increases.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The higher temperature reservoir does not but in as much heat as it should and the device would not move that way.**

Could this device possibly function?**no**
Explain: **The temperature reservoirs are not putting in the right amount of work.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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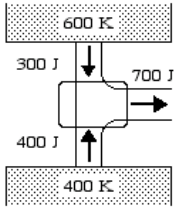

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **in the direction of movement**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **in the direction of movement**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **in the direction of movement**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **I can't remember what the first law is**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **we haven't even talked about this in class yet, and I don't read**

Could this device possibly function?**no**
Explain: **mass explosion**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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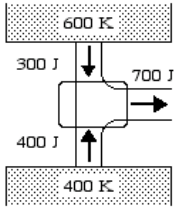

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **because the substance is gaining energy and they are combining together.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **losing heat to reach equilibrium**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **gaining heat to reach equilibrium**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **they trade energy and work to reach equiibrium**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **for the same reason as 11**

Could this device possibly function?**yes**
Explain: **it works just like an engine does.**

END OF RESPONSE

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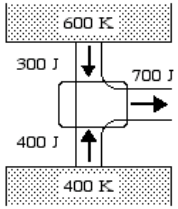

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **because energy is transfered from reservoir to system is +**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **drawing says so**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **drawing says so**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **400+300=700**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **because**

Could this device possibly function?**yes**
Explain: **1+2 = yes**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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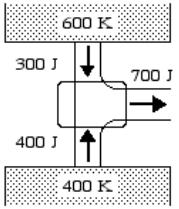


Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain:

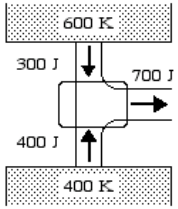
Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **no**
Explain:

Could this device possibly function?**no**
Explain:

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **the substance gets pushed to the right**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **the energy output increases**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Raises temperature**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **It goes with the flow**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **It satisfies the first**

Could this device possibly function?**yes**
Explain: **If you really truly wanted it to.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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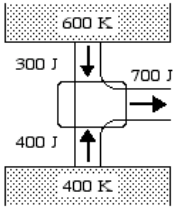

Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **zero**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**no**
Explain:

END OF RESPONSE

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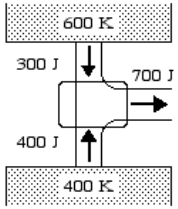

Q1: The work done on the working substance during each cycle would be; **not enough information is given**
Explain : **there is no distance described on the working substance**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **not enough informaion is given**
Explain: **we do not know what temp the working substance is at, it may be hotter than the temp being put onto it**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **not enough information is given**
Explain: **same answer as above**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **there would be a transfer of heat from the 600k resevoir to the 400k resevoir**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **it would do so**

Could this device possibly function?**not enough information is given**
Explain: **i can't tell**

END OF RESPONSE

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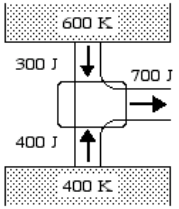

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **A hurricane is coming and you come up on a bus stop. One person is an old woman, sweet and gentle. One person is your best friend who saved your life. The other person is you dream girl/guy. Which do you choose?**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **unanswered**
Explain: **Why did you make your choice.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **You are on a game show with a chance to win a car. Behind one door is the car, and behind two other doors, goats. You pick the middle door and the host reveals a goat in the first door. Do you stay with your choice of the middle door or change your choice to the last door?**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **Did you change doors? Probability of winning increases if you did.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **I gotta tell you usually i just blow through these pretests writing "I dont know" in every blank, but this is much more fun.**

Could this device possibly function?**yes**
Explain: **I hope this made your day a little bit better.**

END OF RESPONSE

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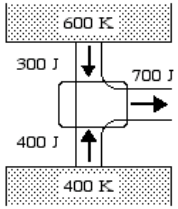

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **No movement of parts, only transfer of heat.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **It is heating it up, not cooling it down.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **The heat energy will be flowing from hottest to coldest.**

Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain. **I don't know about the pressure or volume.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The heat is not moving from the hottest side to the coolest side.**

Could this device possibly function?**no**
Explain: **The second law is not obeyed.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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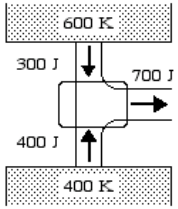

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **adding heat does positive work**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **you are adding energy**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **you are adding positive joules**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **the output should be greater**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **i am not sure what the second law is**

Could this device possibly function?**yes**
Explain: **massive entropy**

END OF RESPONSE

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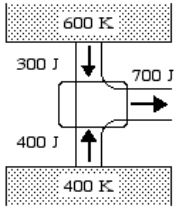

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Because it is**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Because it is**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **there is no external forces**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **its not**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **its not**

Could this device possibly function?**no**
Explain: **it violates both laws**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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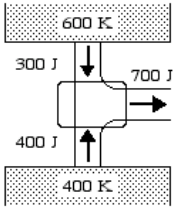

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **it gains energy.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **it is losing energy into the working substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **it is taking energy from the working substance.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **energy is conserved.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **they didn't find an equilibrium**

Could this device possibly function?**no**
Explain: **the heat transfer from the hot to the cold would make the working substance a colder temperature.**

END OF RESPONSE

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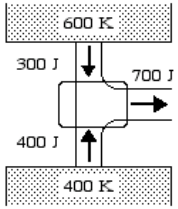

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **There is a positive change in the kinetic energy.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The energy contributes to the overall positive change in kinetic energy.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **This energy also contributes positively.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **It conserves energy.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Yes because it needs heat from 2 reservoirs.**

Could this device possibly function?**yes**
Explain: **It has enough energy.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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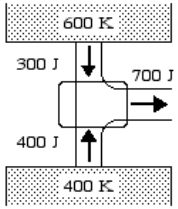

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Object is heated?**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **because the temperature of the object cannot be higher than the high temp reservoir heat will be transfered from the reservoir so the object.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **heat from the high temp reservoir will pass to the object then pass into the low temp res.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **if it worked the way the diagram shows it would be not be moving towards thermal eq. As heat will be transfered into the low temp res not out of it as shown.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Not remotely sure on this as i have not read about entropy. But I'm leaning towards no because entropy is the loss of energy to a useless form usually heat and the system shown is flawless it loses no energy to entropic forms anywhere.**

Could this device possibly function?**no**
Explain: **going to go with no since it violates the 1st law and i belive the 2nd law.**

END OF RESPONSE

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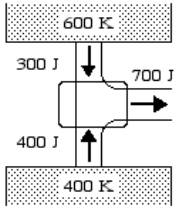


Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **the work done by the system to the surrounding is zero because if the arrow indicate the work done on the system when you add them up, it will sum up to zero. -300J -400 J + 700 J equals to zero.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **the heat transfer from the surrounding to the system so it heat transferred to the working substance is positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **the heat transfer from the surrounding to the system so it heat transferred to the working substance is positive.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **you could have no work but there can still be heat transfer.**

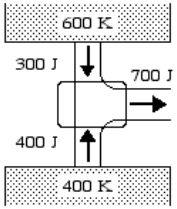
Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**999**
Explain:

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **no**
Explain:

Could this device possibly function?**no**
Explain:

END OF RESPONSE

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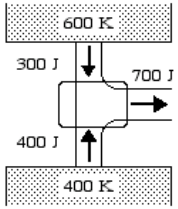

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Heat is being added to the working substance, therefore, work done will be positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The high temperature reservoir adds heat to the working substance, doing work on it.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **This reservoir still adds heat to the substance, doing work on it.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Yes, the change in energy in this case is equal to the difference between the heat and work.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **The device is consistent with the second law of thermodynamics.**

Could this device possibly function?**yes**
Explain: **The device satisfies both the first and second laws of thermodynamics.**

END OF RESPONSE

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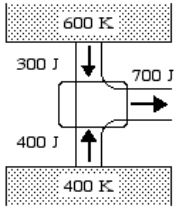

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **because**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **not sure**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **opposite high temp.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **it would**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **it wouldn't**

Could this device possibly function?**no**
Explain: **if it doesn't follow one rule then it can't happen**

END OF RESPONSE

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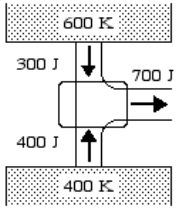

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **The working substance does not appear to be in motion.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The amount put in is less than the amount that is put out.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Same reason as above.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **There is no work and output is greater than input.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **The heat transfer does not violate this law. It flows as it should.**

Could this device possibly function?**no**
Explain: **Energy (in the form of heat) is not conserved, making this impossible.**

END OF RESPONSE

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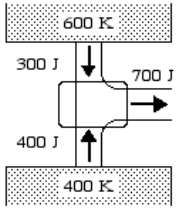

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The displacement of the gas is in the direction of the force of the gas.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The heat is leaving the high temperature reservoir and losing it to the surrounding gas.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It is gaining the heat from the higher temperature reservoir.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Yes the energy could satisfy the first law of thermodynamics because the change in internal energy would equal the work.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The second law states that there can't be 100% efficiency with heat transfer so the work couldn't be 700 J.**

Could this device possibly function?**no**
Explain: **Not with the information given, it can't have that kind of efficiency.**

END OF RESPONSE

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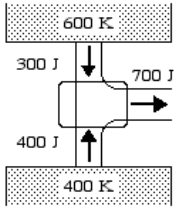

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **The substance would not add up to 700 because it isn't quantitative.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **I don't know.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **The high temp substance overpowers it.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **in the pic it doesn't move from hot to cold.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **it would be less than 700 for the output because of the chaos created.**

Could this device possibly function?**no**
Explain: **2nd law of thermodynamics**

END OF RESPONSE

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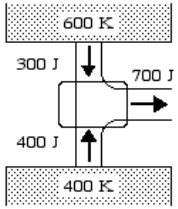

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The working substance is gaining heat, so the change in kinetic energy is positive and so is the work.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat from the high temperature reservoirs will transfer to the substance with less heat.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Since it is at a lower temperature, it would be gaining heat.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The transfers of heat would be moving toward thermodynamic equilibrium.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **I'm not really sure.**

Could this device possibly function?**yes**
Explain: **Again, I'm not really sure. I don't have my book with me like I thought I did.**

END OF RESPONSE

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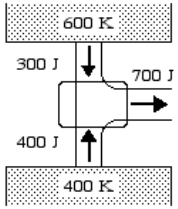

Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **no**
Explain:

Could this device possibly function?**yes**
Explain:

END OF RESPONSE

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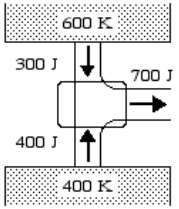

Q1: The work done on the working substance during each cycle would be; **negative**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **zero**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **no**
Explain:

Could this device possibly function?**yes**
Explain:

END OF RESPONSE

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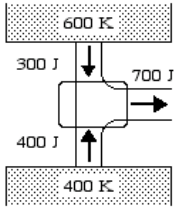

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **There is a positive force and a change in temperature which indicates that work must be done.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The heat from the high temperature reservoir is coming into contact with heat from the lower temperature reservoir which means that the heat from the high temperature reservoir will decrease and thus be negative.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The fluid from the low temperature reservoir will increase in temperature after coming into contact with the fluid from the high temperature reservoir.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Energy would be conserved and both reservoir fluids would eventually reach equilibrium.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **There is a specified direction of energy transfer. There is no spontaneous cold to hold change occurring because the cool reservoir is coming into contact with the hot reservoir.**

Could this device possibly function?**no**
Explain: **This is an idealized Carnot heat engine which in theory could work but in reality cannot work because no engine can be 100% efficient, and this engine is supposed to be 100% efficient.**

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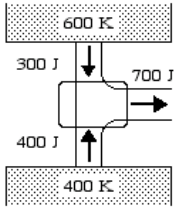

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **It is doing positive work, so the work done on it is negative**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat is flowing into the substance**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **There is positive heat because energy is flowing into the system**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **U2-U1=Q-W**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Temp converted completely into work**

Could this device possibly function?**no**
Explain: **Violates 2nd law of thermodynamics**

END OF RESPONSE

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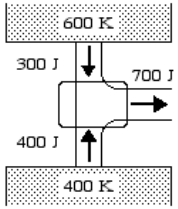

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **because the work done on and by is the same.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Because it is being transferred TO.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **because it is work transferred TO.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Because the heat it gets is the same or less than the heat it gives off.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Same reason as above.**

Could this device possibly function?**no**
Explain: **because the work given to and gave off is the same so the device does not funciton.**

END OF RESPONSE

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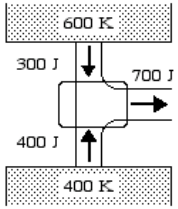

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The direction of force and the movement of the substance are in the same direction.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The direction of heat is toward the working substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The direction of heat is toward the working substance.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Energy is equal to the heat transfer minus the work done by the system. This is true for this situation. The heat is being transfered to the system.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **The heat is being transfered from the heat reservoirs and out of the system.**

Could this device possibly function?**yes**
Explain: **It takes 300J to move from one reservoir and 400J to move from the other, and 700J are leaving the system.**

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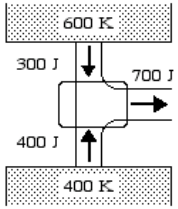

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The energy is taken in and then translated out to a new reservoir so the work done would be positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The work done would be positive because volume does not change and so pressure increases so the graph would be positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **The transferr would be away from the working substance which would lose it's energy and work.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The heat transferrs would satisfy the first law due to the fact that all of it can be explained with it.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **No because for some strange reason the heat transferrs from a cold to a hot.**

Could this device possibly function?**no**
Explain: **I see no reason why this device would work without having the second law of thermodynamics work.**

END OF RESPONSE

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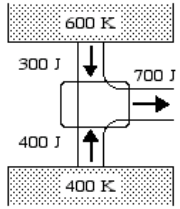

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **because there is no increase in energy. only n addition of energy.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Because the reservoir would be gaining heat from it**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Because this will be using the reservoirs energy**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Because the enrgiyes would balance**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **...**

Could this device possibly function?**not enough information is given**
Explain: **not sure. what is it supposed to be doing?**

END OF RESPONSE

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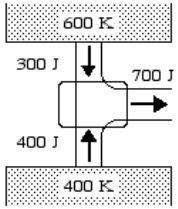

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **There is an output, therefor work must be positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **There is a loss in J between the two sources.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Work produces heat.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Equal, negative to a positive,**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **cannot transfer heat from a colder to warmer body.**

Could this device possibly function?**yes**
Explain: **follows first and second laws of thermodynamics.**

END OF RESPONSE

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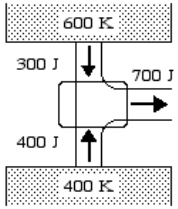

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Heat is transferred intot**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat is gained**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Heat is gained**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Heat gained equals heat lost**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **I dont know**

Could this device possibly function?**yes**
Explain: **It depends on whether the second law is satisfied**

END OF RESPONSE

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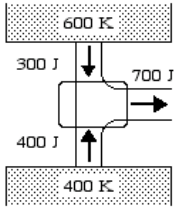

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **If heat is being transfered to the system, the object is doing work on the system, since the work done is proportional to the heat it gains.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **It has higher temp than the lower reservoir**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **It has a lower temp than the higher reservoir**

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**no**
Explain:

END OF RESPONSE

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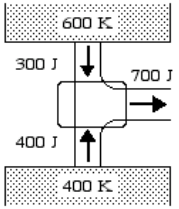


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **It heats up**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Heat is leaving**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It is gaining**

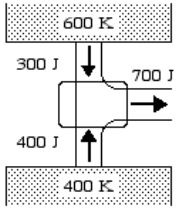
Would this device satisfy the first law of thermodynamics? **yes**
Explain. **It doesnt violate it**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **It violates it**

Could this device possibly function?**yes**
Explain: **It would funciton**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **work is positive**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **zero**
Explain: **there is no heat transfer**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **duh**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **heat is conserved**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **heat is not conserved**

Could this device possibly function?**yes**
Explain: **of course**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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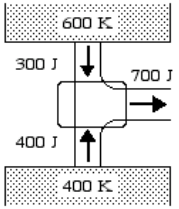

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **700J of work ae being taken out of the system.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **300 J are transferred to to the working substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **400 J are transferred to the working substance.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Q-W= 0 because the amount of heat added is exactly equal to the work flowing out of the system.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **All of the heat flowing in is transferred completely to mechanical work and by the second law of thermodynamics, this is not possible.**

Could this device possibly function?**no**
Explain: **A system cannot exist that doesn't satisfy the second law of thermodynamics.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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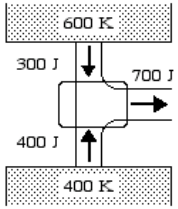

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **no change to pressure or volume**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **it is taking in energy**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **it is giving off heat**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **the signs of each are correct**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **uhhhh.**

Could this device possibly function?**yes**
Explain: **it satisfies both laws**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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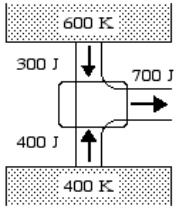

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **Nothing is moving so there is no work.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat is being transfered to the substance not from it.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **There is no low temperature transfered.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The equation U=Q-w is met.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **There is no work.**

Could this device possibly function?**yes**
Explain: **With the right substance.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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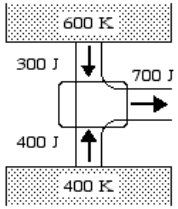

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **work is being done on the system**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **same as above**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **because it is opposite**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **energy is conserved**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **each act equal and opposite**

Could this device possibly function?**yes**
Explain: **becuase it obeys the laws of thermo**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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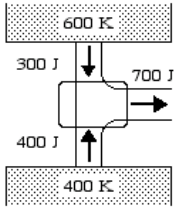


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **heat is going in, so it would be positive**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **heat is going into it, so it would be positive**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **heat is leaving, so it is negative**

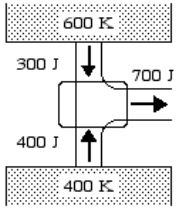
Would this device satisfy the first law of thermodynamics? **yes**
Explain. **work done is related to heat**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **not enough info is given**

Could this device possibly function?**no**
Explain: **the heat being transfered is not equal**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **net work is a positive vector**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **negative b/c heat is leaving.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **negative b/c heat is leaving.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **sure.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **no it would not b/c it does not relate to the second law of thermodynamics.**

Could this device possibly function?**no**
Explain: **No because it has no heat.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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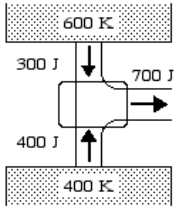

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Temperature decreases, but work still changes because there is still area under the curve from state A to state B.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **zero**
Explain: **heat is conserved.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **same reason**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **heat is transferred and is conserved so it works out.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **energy somehow leaves the system.**

Could this device possibly function?**no**
Explain: **2nd law of thermodynamics doesn't work.**

END OF RESPONSE

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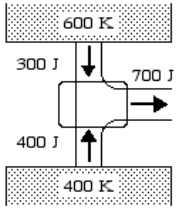

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **Perpendicular to motion equals zero work**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Heat flows from hot to cold**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Heat flows from hot to cold.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Heat will flow from hot to cold**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Because I have no clue at this point what the second law is. Therefor, I guessed using a quarter. I chose tails which was no.**

Could this device possibly function?**no**
Explain: **I need to read this chapter before I can answer any of the following correctly. At this point, this pretest showed me how much knowledge of this chapter I am lacking.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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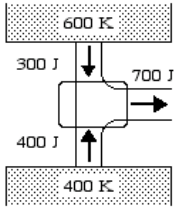

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **Force is perpendicular to the work done.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Heat flows from higher temperatures to lower temperatures so the heat transfer from the hotter reservoir will be negative.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Heat flows from higher temperatures to lower temperatures so the heat transfer from the cooler reservoir will be positive.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Heat flows from high temperatures to low temperatures.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **I really don't know what the second law states. Therefore, ignorance is bliss and an answer in the negatory has a higher rate of success.**

Could this device possibly function?**no**
Explain: **Net work is perpendicular to the works, so no device can rationally function as this device is shown to work.**

END OF RESPONSE

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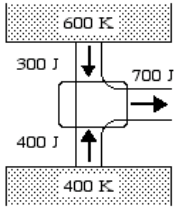

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **the reservoirs are what is doing the work on the working substance, and since they are expelling energy to the working substance, the work must be positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **since the heat transfer is going from the hotter reservoirs to the working substance, and we are looking at it from the perspective of the heat transfer to the working substance, the heat transfer is positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **the lower temp reservoir still is adding heat energy to the working substance, so the heat transfer is positive from the reservoir to the substance**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **for a short period of time, until the reservoirs and substance came to an equilibrium temperature and then the engine would stop**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **it definitely transferred heat and followed the laws of thermodynamics, the only question is how long the system could function before more energy is needed to supply the engine.**

Could this device possibly function?**no**
Explain: **eventually the temperatures would equal out and it would stay at equilibrium. Unless there was another element to the engine, it is not a functioning system.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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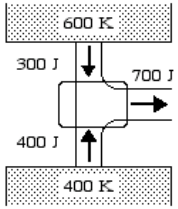

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **The working substance does work on the outside world.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat is transfered from the high temperature reservoir to the working substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The heat is transfered from the low temperature reservoir to the working substance.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The heat transfer on the system is positive, and the work done on the system is negative, so they cancel each other.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Energy from the system is given to the outside world, increasing chaos.**

Could this device possibly function?**yes**
Explain: **It satisfies both laws of thermodynamics.**

END OF RESPONSE

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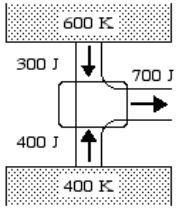

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The work done on the working substance would be positive because heat will be transferred into it by the reservoirs, and the temperature of the substance would increase.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The high temperature reservoir is putting more heat into the substance, which therefore would make the heat transferred positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **The lower temperature reservoir actually decreases the temperature of the substance compared to what the higher temperature reservoir does. It limits the maximum temperature the substance can reach.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The internal energy of the system would increase by the heat transferred into the substance along with the work done on the substance.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **There is mechanical work done on the system, and therefore it could not end in the same state in which it began.**

Could this device possibly function?**no**
Explain: **It does not satisfy the second law of thermodynamics, which makes this device impossible.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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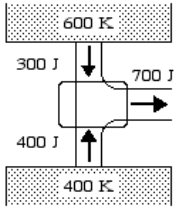

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **the working substance would gain energy from the reservoirs**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat flows from hot to cold.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **It's not as hot as the other reservoir**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **the sum of the heat and work might not equal zero**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **the entropy would increase**

Could this device possibly function?**no**
Explain: **it doesn't satisfy the first law of thermodynamics**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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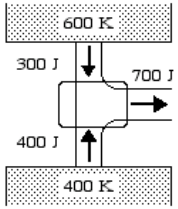

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **It appears the same amount of work is going in as going out, thus the sum is zero.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat will be transferred into the system.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **The lower temperature reservoir will gain heat.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Heat and work are conserved.**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **No information if given about the entropy change over time for the system.**

Could this device possibly function?**no**
Explain: **There is a maximum efficiency that can not be exceeded.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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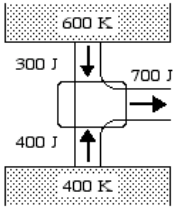

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **because the temperature of the working substance is decreasing**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **because the temperature would be decreasing in the working substance**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **becasue the temperature is decreasing**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **because the temperature does not even out in the center chamber**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **because it is operating at 100% efficiency which is impossible**

Could this device possibly function?**no**
Explain: **because it defies the 2nd law of thermo dynamics**

END OF RESPONSE

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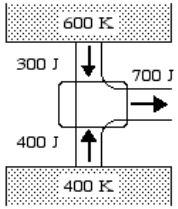

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **im not sure**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **it looses heat**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **cause**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **its lost**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **dw**

Could this device possibly function?**no**
Explain: **wdsa**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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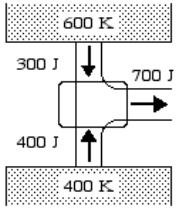

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The heat transfer is in the same direction as the force.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat is transferred to the substance away from the reservoir.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **all the heat would be transferred**

Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain. **There is not enough information**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **It is not possible to determine**

Could this device possibly function?**not enough information is given**
Explain: **Probably not though**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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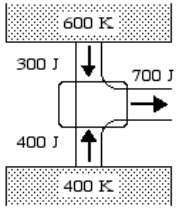


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **energy is add to the system so positive work must be done on the system.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **temperature goes from high to low**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **the low temperature will rise**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **energy is never completely reserved**

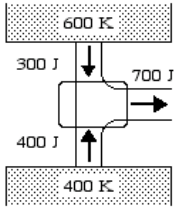
Would this device satisfy the second law of thermodynamics? **unanswered**
Explain: **i don't know the 2nd law**

Could this device possibly function?**unanswered**
Explain:

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **Because it was being compressed.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **As it is being compressed the temperature will rise.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Because it is loseing heat.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The heat is transfered not created or destroyed.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Because it is frictionless**

Could this device possibly function?**no**
Explain: **Some of the heat will always be lost**

END OF RESPONSE

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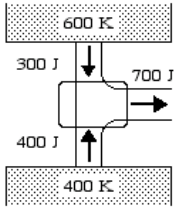

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **This is because the temperature goes down.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Because the heat transfer is going down so therefore it would be a negative value.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **At low temperatures, nothing is done.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **Because there is no work done at low temperature.**

Would this device satisfy the second law of thermodynamics? **999**
Explain:

Could this device possibly function?**999**
Explain:

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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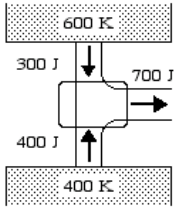

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **U = Q**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Not sure**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Cause it is lower**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **u = q + w**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **not sure**

Could this device possibly function?**yes**
Explain: **because it follows the two laws**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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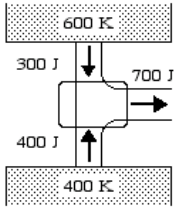

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **because the heat is flowing out of the system and combined to have bigger heat**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **heat is flowing from the high temperature reservoir**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **heat is flowing from the low temperature also**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **two hot material transfering heat to each reservoir, reach EQ temp that is higher**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **it is impossible to have the transfer of heat from a cooler to a hotter body**

Could this device possibly function?**no**
Explain: **since the second law of thermo fails, it would not work**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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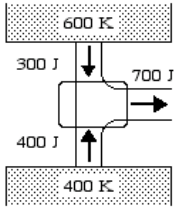


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **U=Q-W so if W were positive, then that internal energy will be taken from the system and used for something else.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **if it were negative, two negatives would make the internal energy of the system negative to begin with.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **the system wants to be at thermal equilibrium so the heat transferred will make that occur**

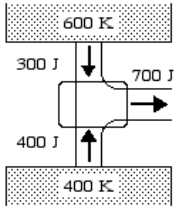
Would this device satisfy the first law of thermodynamics? **yes**
Explain. **the heat transferred will follow the equation u=Q-W**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **the work pulled out of the system will be able to be used for another task**

Could this device possibly function?**yes**
Explain: **it is possible, because the system exerts some work, so depending on what that work is used for, the system will use that work.**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **They come out to be 700J, so work must be positive**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **They can't lose heat but just combine heats**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **The heat transferred will remain the same in the reservoirs**

Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain. **You would have to know about the pressure as well**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **if it doesn't satisfy the first law necessarily, it doesn't have to satisfy the second law**

Could this device possibly function?**no**
Explain: **There is no way to get exactly 700J out of the system because it is not possible to get that kind of efficiency**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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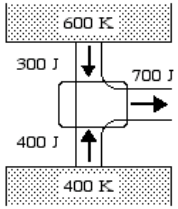

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **Input is same as output.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat transferred TO the system, not away**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **4ooJ in heat energy**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The heat does work**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The heat could not be completely transformed into work**

Could this device possibly function?**yes**
Explain: **It could warm something colder than it's output.**

END OF RESPONSE

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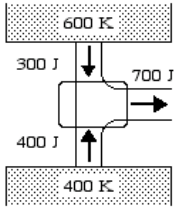

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **dU = dQ - Wout >>> Wout = dQ - dU**

Since dQ (change in heat) increases with respect to the system, Wout (work done by the system on the outside world) increases. Thus work done by the outside on the system must be the opposite.

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat flows from warmer to cooler places. So since this res. is warmer it must be a positive heat flow.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Since this res. is cooler than the substance it must be a negative flow from the res. to the substance.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **The temp out is higher than the temp between the two reservoirs.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Energy isn't conserved.**

Could this device possibly function?**no**
Explain: **Q. 10 and 12**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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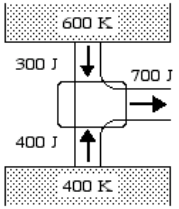

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **positve work**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The heat will go from hot to cold.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The lower temperature will receive heat.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **the change in potential energy will always equal the heat minus the work**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **im not sure**

Could this device possibly function?**yes**
Explain: **it satisfies the laws of thermodynamics**

END OF RESPONSE

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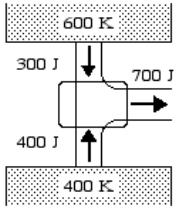

Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **no**
Explain:

Could this device possibly function?**no**
Explain:

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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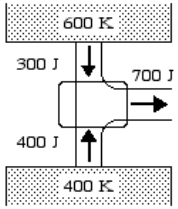

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **because the arrows that points up and down cancel and the one that points to the right is positive**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **zero**
Explain: **because it is kinda like the clicker question in class and the heat transfer was zero.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **because if the heat transfer is zero and the work done is positive then the temperature reservoir durning each cycle is positive**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **because**

Would this device satisfy the second law of thermodynamics? **999**
Explain:

Could this device possibly function?**yes**
Explain: **I think so because it seems to follow the first law of thermo.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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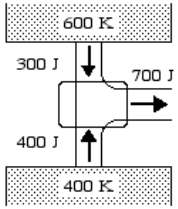

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **no displacement?**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **400 in upward direction**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **300 in neg direction**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **no more energy is put out than in**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **does not turn heat to work (? don't really understand the law)**

Could this device possibly function?**yes**
Explain: **Because it satisfies both laws**

END OF RESPONSE

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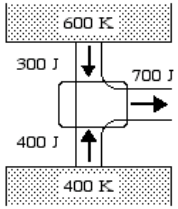

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **The work done on the working substance inward is equal but opposite that of the work done on the working substance outward.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **zero**
Explain: **Heat being put into the substance is equal that of heat leaving the substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **For the system to reach an equilibrium status, heat must be put into the low temperature reservoir, thus the heat transferred to the working substance is negative.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **Heat should be transferred into the low temperature reservoir until the system reaches equilibrium.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **This is because I'm too tired to think and would really rather not be taking this pretest right now.**

Could this device possibly function?**yes**
Explain: **It probably could if I understand what on earth the device was.**

END OF RESPONSE

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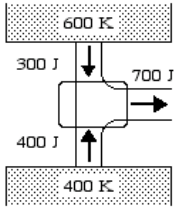

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **Joules going in = joules going out.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Hot stuff sends Joules in the form of heat.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **same as above**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **U = Q - W. U=+, Q=+, W=0 -- this makes sense.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Heat flows from the hot objects to the colder thing.**

Could this device possibly function?**yes**
Explain: **If it follows both laws, then sure, it should work.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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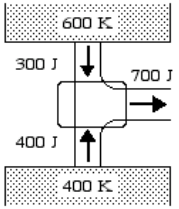

Q1: The work done on the working substance during each cycle would be; **not enough information is given**
Explain : **Not sure if device will function**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Same direction as potential force's direction.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Temperature opposite of work.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The work would come from the temperature change.**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **I'm not sure how the law applies here.**

Could this device possibly function?**yes**
Explain: **If God was in a good mood....**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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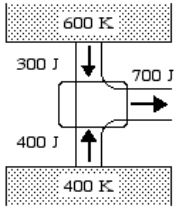

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Because its in the same direction**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Because it can only lose heat**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It will gain heat**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Porque**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Ideal systems do not exist.**

Could this device possibly function?**yes**
Explain: **It could but would function slightly different than explained**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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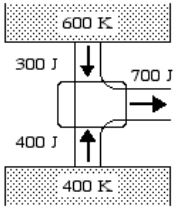

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **adding energy, so doing positive work on it**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **adding energy**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **adding energy**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **im not following**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **assuming that its colder where the heat is going**

Could this device possibly function?**yes**
Explain: **depends on what its doing though, this really shows nothing**

END OF RESPONSE

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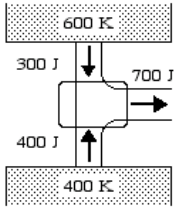

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Work done is positive, because there is heat being transfered out of the system**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Since heat flows from hot objects to cold ones, the heat transfered to the working substance must be positive**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The reservoir has to lose heat, so there is positive transfer**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Because the energy change is positive**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Because this is an idea system, so all the heat energy is transfered/conserved**

Could this device possibly function?**yes**
Explain: **But it wouldn't function as shown above, since there would be some heat lost**

END OF RESPONSE

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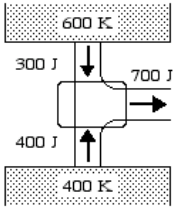


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **because it is**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Qh represents a decrease in heat of the high temp substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **because**

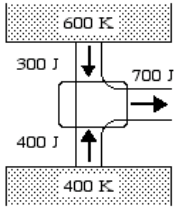
Would this device satisfy the first law of thermodynamics? **no**
Explain. **the 400k block must take heat away from the system, not add.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **entropy wouldn't be decreasing**

Could this device possibly function?**no**
Explain: **the hot temp could not give only 300 J if the cooler one gives 400 J.**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **not enough information is given**
Explain : **Work depends on a volume or distance change. Heat transfer is different than work.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Energy leaves the reservoirs and is transferred to the substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The working substance gains heat, and so positive. The reservoir loses heat, and so is negative.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Internal energy can change if heat is added to a system, which is the case here.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Heat cannot be transferred 100% into mechanical energy.**

Could this device possibly function?**no**
Explain: **Violates 2nd law.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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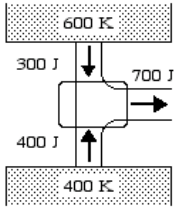

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **because it would have to heat up so the work done on the system would be positive**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **don't know, seems like it would be right**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **not too sure, it would be positive for a while then maybe revert to negetaive because it would be lowering the temp to 400 while the other is trying to raise it to 600**

Would this device satisfy the first law of thermodynamics? **unanswered**
Explain. **don't know**

Would this device satisfy the second law of thermodynamics? **unanswered**
Explain: **don't know**

Could this device possibly function?**unanswered**
Explain: **i don't know what this device is tryin to achieve so i don't know if it would work or not.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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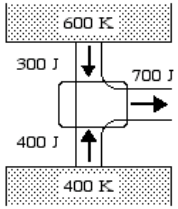

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **no movement**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **transfering 300J to something**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **transfering 400J to something**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **700J goes In and 700J goes out so you have conservation**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **the energy transfered would not add together**

Could this device possibly function?**no**
Explain: **cant have the two add together, you would be limited by the highest temp**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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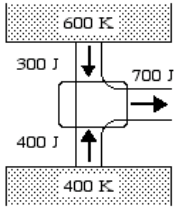

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **its a thermodynamic system. no work is done.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **it is giving off heat energy.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **it is taking the heat from the surroundings.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **it just would**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **it cant.**

Could this device possibly function?**no**
Explain: **it doesnt follow the second law of thermodynamics.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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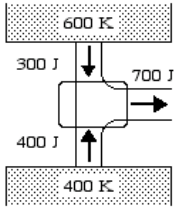

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Qh into working material, so pos. Qc into material, so pos. then W = Q so pos.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Qh into working material, so pos. Qc into material, so pos.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **heat going into the cold res. is negative, so going out should be pos?**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **not sure**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Heat will not flow from the colder object to the warmer object**

Could this device possibly function?**no**
Explain: **same as for 11**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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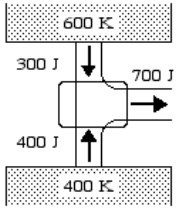


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **This depends on the initial energy state of the working substance.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **700J is the end product.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Same as above.**

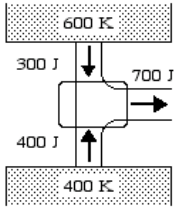
Would this device satisfy the first law of thermodynamics? **yes**
Explain. **700 J is the output.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **I don't know!!**

Could this device possibly function?**yes**
Explain: **Same as above. Will go back to the book before class!!!!**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **why not?**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **i don't know**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **not enough information is given**
Explain: **i forgot the equations**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **1st law**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **foget**

Could this device possibly function?**unanswered**
Explain: **i don't know**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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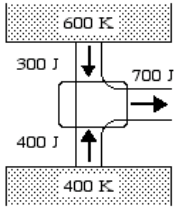

Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain:

Would this device satisfy the first law of thermodynamics? **unanswered**
Explain.

Would this device satisfy the second law of thermodynamics? **no**
Explain:

Could this device possibly function?**unanswered**
Explain:

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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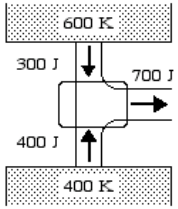

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Each resevoir does positive work on the device because they apply heat to it.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The arrows represent the heat transferred to the substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The arrow indicates that even the low temperature reservoir is applying heat to the substance.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Apparently you put 700 J into it each cycle and it spits 700 J out. So the net heat is zero, and you are doing work on it so the rise in internal energy would be equal to the work done on it.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **It can't accept heat from a source and return to exactly the same state it was just in.**

Could this device possibly function?**no**
Explain: **It violates the second law of thermodynamics**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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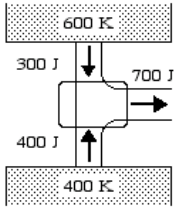

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **700 J is output**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **A low temp is being added**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **A high temp is being added**

Would this device satisfy the first law of thermodynamics? **unanswered**
Explain. **possibly**

Would this device satisfy the second law of thermodynamics? **unanswered**
Explain: **probably**

Could this device possibly function?**yes**
Explain: **I own one**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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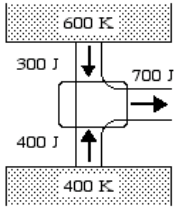

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Energy is being put into the substance.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat is transfered from the reservoirs to the substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **According to the arrows, heat would flow out of both reservoirs.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **The higher temperature would heat the substance until it was hotter then the lower temperature, and heat would flow into that reservoir.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The lower reservoir would heat up, so the diagram is false.**

Could this device possibly function?**no**
Explain: **Fails both laws of thermal dynamics.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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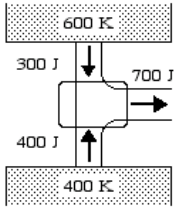

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The work done on the working substance during each cycle is positive because heat is being added to the substance during each cycle.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat transferred to the working substnace from the high temperature reservoir during each cvle is positive because the temperature of the working substance is increasing.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The heat transferred to the working subtance from teh low temperature reservoir during each cycle is positive becasue the temperature of the working subtance still increases.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Yes, becasue there is heast transfer as well as work done on the working substance and therefore there would be a change in internal energy.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Yes, this device satisfies the second law of thermodynamics becuase although it absorbs heat from a reservoir the system does not end in the same state in which it began.**

Could this device possibly function?**yes**
Explain: **Yes, because it satisfies the first and second law of thermodynamics.**

END OF RESPONSE

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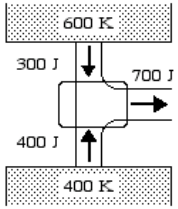

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **heat transfer will exert work through the engine onto the substance each cycle**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **heat flows from high concentrations to low concentrations**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **heat would flow into this reservoir from the hotter reservoir**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **heat must be transfered through an engine not into an engine. heat must transfer from a higher concentration to a lower concentration and cannot transfer without this unequal distribution of heat change in U=Q-W**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **heat can only flow in one direction, not both**

Could this device possibly function?**no**
Explain: **the heat has to flow somewhere other than an engine! it cant just flow into the engine and magically become work, it just doesnt work like that**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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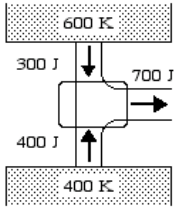

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **the force is to the same direction as the displacement**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **if the work is positive then, the heat trasfer must be too**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **opposite**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **since, the previous question is negative, the transfer energy should be 0**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **it should have**

Could this device possibly function?**no**
Explain: **I am not quite sure if it would actually work**

END OF RESPONSE

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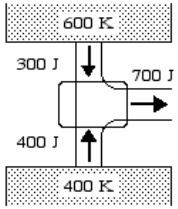

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **To the right.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **It would give heat to the substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **It would take heat from the substance.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **The arrow to the left doesn't make sense.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Arrow to the right.**

Could this device possibly function?**no**
Explain: **It defies the laws of physics.**

END OF RESPONSE

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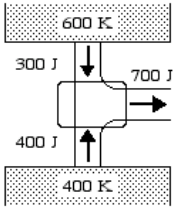

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **total guess**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **heat is being moved into the resovoir**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **heat is being moved into the resovoir**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **total guess**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **guess**

Could this device possibly function?**no**
Explain: **not if it doesnt statisfy rules**

END OF RESPONSE

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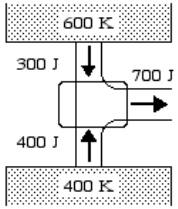

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **no idea**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **it's heat decreases**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **it gains heat**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **why not**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **because i said so**

Could this device possibly function?**no**
Explain: **cause i feel like it**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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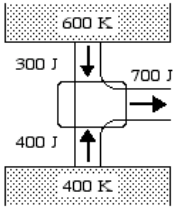


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **It's doing work so it has to be positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Since there is work being done, heat is being created so it has to be positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The first law equation**

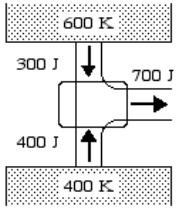
Would this device satisfy the first law of thermodynamics? **no**
Explain. **ONe variable goes up and the other goes down like in the first law**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **One has to lose some to go to the other, there is no such thing as a 100% effeciency**

Could this device possibly function?**yes**
Explain: **One gives more energy then the other and it is putting off more then is returned so it is possible. It is not a 100% effecient**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **Because 700 J total is put into the substance and 700 J comes out the the total work is 0**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **zero**
Explain: **for similar reasoning above becuase the same amount of energy is put in and comes out similar heating effects happen**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **because its heat would be positive becuase the working substance is being heated.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **because the potential stays constant**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **because you could put 700 J into the substance and it would put 700 J into the others but not evenly**

Could this device possibly function?**yes**
Explain: **as long as the structer didnt fail, and could handle the heat and energy inputs and outputs it could be possible**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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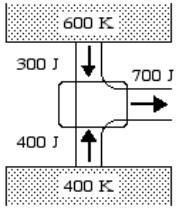

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **because the total heat is 1000k and the work being done is only 700k**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **because the heat is 600k and the work beign put out by it is only 300k**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **all the heat is being transfered**

Would this device satisfy the first law of thermodynamics? **no**
Explain.

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**yes**
Explain:

END OF RESPONSE

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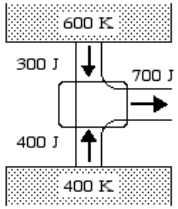

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The heat transfer is into the object so the work is positive**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **it is larger and the direction and displacement are the same**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **it is smaller but direction and displacement are still the same direction**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **yes since there is a change in internal energy so that minus work gives off heat**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **there would be friction and energy lost to other processes. entropy**

Could this device possibly function?**no**
Explain: **it must satisfy the first and second laws of thermodynamics**

END OF RESPONSE

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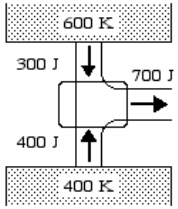

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **there isnt a force or change in pressure**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **heat will be transfered because there is a difference in temperature.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **the diagram shows heat flowing from that reservoir.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **no work is done but the temperatur changes by heat transfer.**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **what is the 2nd law?**

Could this device possibly function?**yes**
Explain: **it satisfies the 1st law**

END OF RESPONSE

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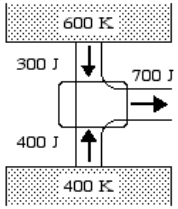

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The arrows point to the working substance.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **following arrows...**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **same**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **No energy seems to be created**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **its flowing**

Could this device possibly function?**not enough information is given**
Explain: **I have no clue.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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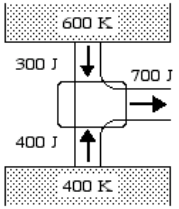

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **It gains and loses the same energy, so it is zero.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **It loses heat because it is going to a lower area, so it would be a negative change.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Since the heat is rising, it is a positive change.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **I don't know.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **I don't know.**

Could this device possibly function?**no**
Explain: **I don't know.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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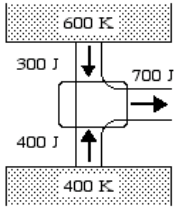

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The force is in the direction of the displacemnt thus work is positive**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The heat transfer will be negative**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **it would make the low temp reservoir have a higher temp**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **the device would satisfy the first law**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **i dont know why**

Could this device possibly function?**unanswered**
Explain:

END OF RESPONSE

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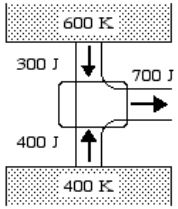

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **THe net heat transfer is zero**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat moves from the higher temperature substances to the resivoir**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Heat moves from the reservoir to the substance again**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **The different parts are at different temperatures**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **We still do not know in class what the second law of thermodynamics is**

Could this device possibly function?**yes**
Explain: **If the device initially functions it should still function because the net change in heat is zero**

END OF RESPONSE

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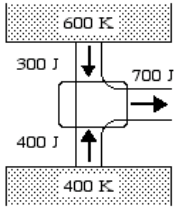

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **The energy out is the same as the energy in.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **zero**
Explain: **All the heat goes out of the machine.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **All the heat goes out of the machine.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **That's the basis of my answers to the other questions, at least.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **It would be 100% efficient, so that would leave no room for the entropy to increase.**

Could this device possibly function?**no**
Explain: **It's called the second "law" of thermodynamics for a reason.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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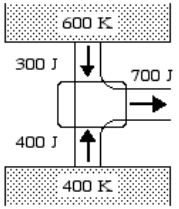

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **I don't understand the picture... Does it say the top reservoir is giving the substance 300 J of energy, and the bottom reservoir is giving the substance 400 J of energy? That should mean the total energy would be 700J, so work would be positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **not enough informaion is given**
Explain: **Again, I don't really understand. I'd think heat would be transferred from the reservoir to the substance if the substance was a lower temperature than the reservoir.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **not enough information is given**
Explain: **It depend on the temperature of the substance.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The energy going is is not less than the energy going out of the system.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The hotter reservoir gives less energy, so I don't know if that is possible.**

Could this device possibly function?**no**
Explain: **Eventually, the substance will be hotter than the lower reservoir (maybe?) and the lower reservoir will not be able to add more energy to the substance. But honestly, I have no clue what's going on here.**

END OF RESPONSE

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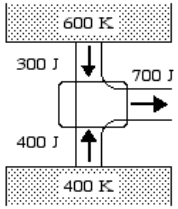

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **force in direction of flow**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **increase in temp**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **decrease in temp**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **not isolated**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **ideal gas?**

Could this device possibly function?**no**
Explain: **first law broken**

END OF RESPONSE

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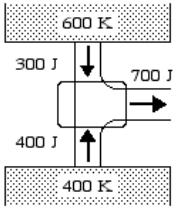

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **energy is being put into the working substance**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **because heat is leaving the high temp resevoirs**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **heat is leaving the low temp resevoir**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **yes because work is being done by the system and heat is leaving the system**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **not enough info**

Could this device possibly function?**not enough information is given**
Explain: **not enough info**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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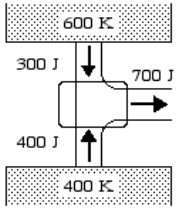

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **there is no displacement**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **It is increasing the heat in the system**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **still higher temp than the substance**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **energy equals heat transfer plus work done by the outside on the system**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **because it has too much heat energy involved**

Could this device possibly function?**no**
Explain: **It doesn't pass the second law so it couldn't function.**

END OF RESPONSE

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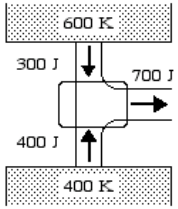

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **direction of force out of the system on the external...positive work**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **zero**
Explain: **just heats the system...does not do work**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **just transfers heat...does not do work....perpendicular to the work**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **heat of system eguals the change in internal energy plus work....system gains heat....internal energy goes up and it does work**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **2nd law states that it cannot create direct mechanical work from heat**

Could this device possibly function?**no**
Explain: **violates 2nd law of thermodynamics**

END OF RESPONSE

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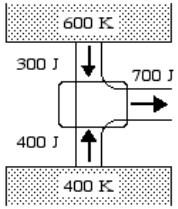

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **because the two resiviors are mixing causing work o be done.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The heat travels from cold to hot and therefor it would be negative.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It goes from cold to hot so i would be positive.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Because it fits the equation u = q-w just fine.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **It satitfyies it just fine because it goes from cold to hot and work is being done.**

Could this device possibly function?**yes**
Explain: **mixing the hot and cold to together is possible with the given amount of work and heat given.**

END OF RESPONSE

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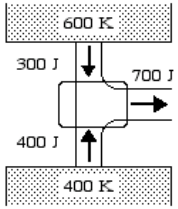

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Adding the two reservoirs together.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **High to low**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **low to high**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **Work is different therefore change in internal energy woild not be the same.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **some of the high goes to the low resevoir and some to work.**

Could this device possibly function?**no**
Explain: **it doesn't satisfy both laws of thermodynamics.**

END OF RESPONSE

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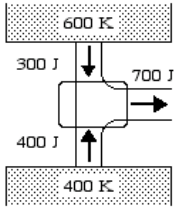

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **It's negative because energy is being let out of the system.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The temperature would be decreasing, so it would be negative.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The temperature would be increasing, so it would be positive.**

Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain. **You need to know more than what the picture shows. You need to know exactly how the heat is being transferred instead of just guessing.**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **Once again, we need more information on how heat is being transferred.**

Could this device possibly function?**no**
Explain: **The energy is not conserved.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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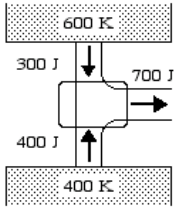

Q1: The work done on the working substance during each cycle would be; **unanswered**
Explain : **not sure i think it depends on if it is an isolated system.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **it is adding heat so that should make it positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **although it is a lower temp reservoir it is still adding to the working substance making it a positive addition.**

Would this device satisfy the first law of thermodynamics? **unanswered**
Explain. **cant remember which one is which**

Would this device satisfy the second law of thermodynamics? **unanswered**
Explain: **same as above**

Could this device possibly function?**unanswered**
Explain:

END OF RESPONSE

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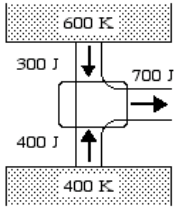


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Heat is being added to the substance, so the work is positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **the heat is being transfered to the working substance, so the work has to be positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Again, if heat is being transfered to the substance, positive work is being done to it.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The total change in energy is equal to the sum of the individual parts.**

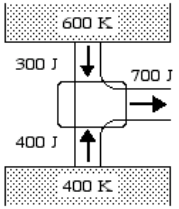
Would this device satisfy the second law of thermodynamics? **no**
Explain: **No, heat would not be transfered from the colder side to the warmer working substance.**

Could this device possibly function?**no**
Explain: **The two temperature differences make it so this device cannot function. Heat would be transfered from the warmer side to the colder side, and not into the working liquid.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Heat is positive**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat is being transfered from the temp. reservoir so work would be positive**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Still positive temp**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Everything is in equilibrium**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Nothing operates at 100% efficiency**

Could this device possibly function?**not enough information is given**
Explain:

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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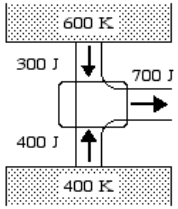

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **All the values given in Joules are positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The temperature is high, but the energy is low.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It has the lower temperature so it has to compensate for the heat transferred from the high temperature reservoir.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **There is positive heat transfer and an increase in internal energy.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **There is energy transfer.**

Could this device possibly function?**yes**
Explain: **It obeys the first and second laws of thermodynamics.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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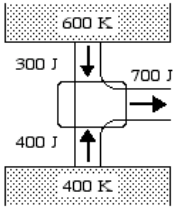

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **the device seems add the incoming heat and create work of equal Joules from it.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The heat reservoir give off heat to create the work so it will be losing heat.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **same reason as 7.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **the work and heat transfer don't add up correctly.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **You can just turn heat transfered from high temp. reservoirs into straight up mechanical work.**

Could this device possibly function?**no**
Explain: **This goes against the second law of Thermodynamics.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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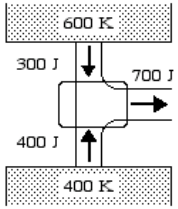


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **the displacement and velocity are going the same way**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **the heat is increasing un the picture and increases are positive**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **not really sure but it seems alright**

Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain. **i dont know the law off hand**

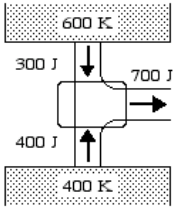
Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **dont have the book to find the law**

Could this device possibly function?**no**
Explain: **it just doesnt seem possiable to get more out than you put in**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **the work is done one the substance**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **substance gets hotter**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **the other substance must get colder**

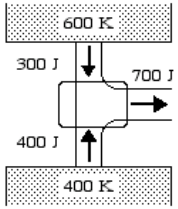
Would this device satisfy the first law of thermodynamics? **yes**
Explain. **everything adds up**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **everything adds up**

Could this device possibly function?**no**
Explain: **joules and kelvin are not the same**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The work is positive because the heat that is coming out at the end is hotter then both of the temperatures being put into the system, meaning positive work must be done**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **It is hotter then the other substance being added to the working substance so it has a positive heat transfer.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **It is negative because it is cooler then the other substance being added to the working substance**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Because U=Q-W and the work is positive, so the energy of the system is positive, making it fit the first law.**

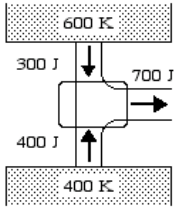
Would this device satisfy the second law of thermodynamics? **yes**
Explain: **It satisfies the second law because it volume stays constant while its pressure and temperature increase.**

Could this device possibly function?**yes**
Explain: **It can function because it first the first and second laws of thermodynamics.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **700 done on the system.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The reservoirs are hotter so they would transfer positive heat.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Stiller hotter than the system.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Same work in as out.**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **Do not know what formthe enery is in.**

Could this device possibly function?**yes**
Explain: **If the entropy rises it could function.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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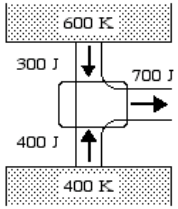

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **the displacement is perpendicular to the force**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **It gives off heat to the substance**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It gives off heat to the substance**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The heat added to the system changes the system**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The system is not in the same position at the end**

Could this device possibly function?**no**
Explain: **It doesn't satsify the laws of thermo**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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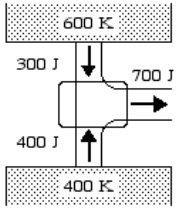


Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **Because the internal energy is increased**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain:

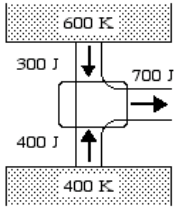
Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Becuase the 1st law says that U = Q-W, and in this case the heat (Q) is increased and the work is negative so the internal energy increases.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Not sure about this question.**

Could this device possibly function?**unanswered**
Explain: **To be honest I have no idea.**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **In order for the output of the device to be equal to the input the working substance would generate more energy then put in.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Since energy change is zero and work is positive the temperature change must be negative.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Both reservoirs act as the one input.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Yes the energy in is equal to the difference in temperature and work.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Entropy would increase but it doesn't in this device.**

Could this device possibly function?**no**
Explain: **Doesn't satisfy the laws of thermodynamics.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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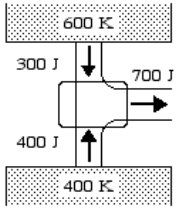


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **This is due to the formula W=Qh + Qc**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **This is because it gains heat from a higher temperature reservoir.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **This is because it losses heat to the lower temperature reservoir.**

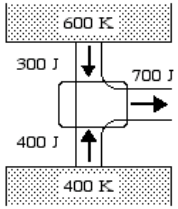
Would this device satisfy the first law of thermodynamics? **yes**
Explain. **This is because there is heat transfered and work being done.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **This is because heat isn't completely converted to energy, some is lost to the lower temperature reservoir. Also, it is transfering heat from a hotter body to a cooler body.**

Could this device possibly function?**yes**
Explain: **This is because it satisfies the first and second laws of thermodynamics.**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **heat is being transferred**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **there will be a positive change in internal energy, therefore work is positive and also heat transferred is also positive**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **there will be a positive change in internal energy, therefore work is positive and also heat transferred is also positive**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **there will be a positive change in internal energy, therefore work is positive and also heat transferred is also positive**

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**yes**
Explain: **satisfies both the first and second law of thermodynamics**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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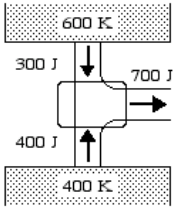

Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**no**
Explain:

END OF RESPONSE

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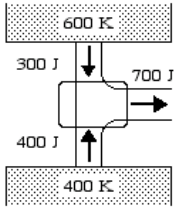

Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **no**
Explain:

Could this device possibly function?**yes**
Explain:

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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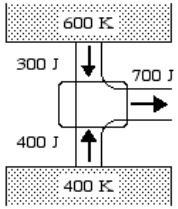

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **the work is the arrow to the right so it is positive**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **it as excess heat and it will reach equilibrium**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **will be colder so will tranfer negative heat to reach equilibrium**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **the internal energy changes and there is work done**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **thermal equilibrium-heat moves from warm to cold**

Could this device possibly function?**yes**
Explain: **satisfies both laws**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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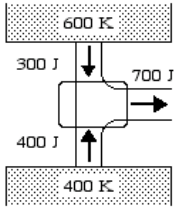

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Because i see no reason for it to be negative.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The reserviors lose heat for the working substance would recieve this heat as positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **I am assuming the working substance is initially at a lower temp before both reservoirs add their heat.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **I don't really know.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **I don't really know.**

Could this device possibly function?**yes**
Explain: **I don't really know**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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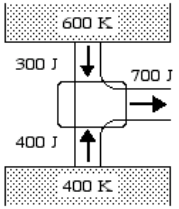

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **displacement and force are in same direction**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **reach equilibrium, so it cools**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **in order to reach equilibrium, it heats**

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **unanswered**
Explain: **i don't know**

Could this device possibly function?**yes**
Explain: **guess?**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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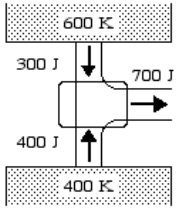

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **NOT SURE**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **NOT SURE**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **NOT SURE**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **NOT SURE**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **NOT SURE**

Could this device possibly function?**yes**
Explain: **NOT SURE**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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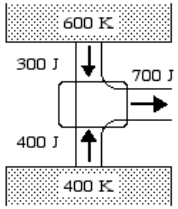


Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **work done on substance is equal to work going out**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **its less than the temp**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **its equal to the temp**

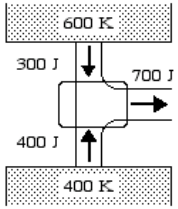
Would this device satisfy the first law of thermodynamics? **no**
Explain. **u is not equal to q-w**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **its not equal and opposite**

Could this device possibly function?**no**
Explain: **the laws are not satisfied**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **W = abs(Qh)-abs(Qc), so the work done is positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The high temperature heats up the cooler temperature.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **The cooler temperature will take out some of the heat in working substance.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The heat in the system equals the change in energy and work.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **It is impossibe for a process to only transfer heat form a cooler to a hotter body**

Could this device possibly function?**no**
Explain: **It doesn't follow the second law.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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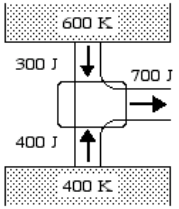


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Positive. There is positive heat transfer going into each cycle, which leads to positive work.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **There is heat being transfered to each cycle, therefore it is positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Although it is a lower temperature system, there is still heat being transferred from it, making it positive.**

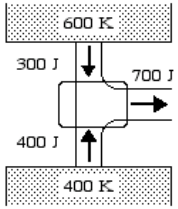
Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain. **we do not know about an external force that is being acted on by the system.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **yes, because the reservoirs will lose heat, thus making less work over time.**

Could this device possibly function?**yes**
Explain: **yes, it just depends on whatever external work is being done by this system.**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **because the temperature will not increase.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Because the heat will average between the high and low**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **because the heat will increase.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The internal change will be zero as heat and work change.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **I do not know.**

Could this device possibly function?**no**
Explain: **There is not enough energy out put.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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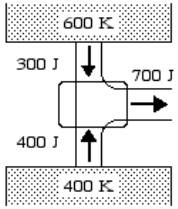

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **Since the device works in a cycle, it sounds like everything will be flowing in a pattern an eventually come back around to where it had started previously, therefore the work done is zero.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **It would still be positive because the heat is transfered to the working substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **It would still be positive because the heat is transferred to the working substance.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **Because heat is transferred until the state of equilibrium, the diagram does not show that state of mind. It continues to gather heat well beyond what the reservoirs have.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Because heat is transferred until the state of equilibrium, the diagram does not show that state of mind. It continues to gather heat well beyond what the reservoirs have.**

Could this device possibly function?**no**
Explain: **Because heat is transferred until the state of equilibrium, the diagram does not show that state of mind. It continues to gather heat well beyond what the reservoirs have.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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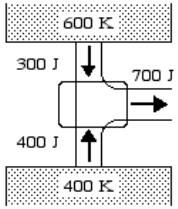

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **700J of work goes in, 700J of work goes out. Net work is zero**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **when the substance reaches equilibrium, its temp will be between that of each reservoir; the high-temp one will still be contributing heat to it.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **the substance should equalize at 500K, so the heat transfer between the substance and the 400K reservoir would be negative; toward the 400K.**

Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain. **there is not enough information on the state variables to make claims about the possibility of the system**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **there is not enough information on the state variables to make claims about the possibility of the system**

Could this device possibly function?**not enough information is given**
Explain: **again, the lack of information makes it hard to judge**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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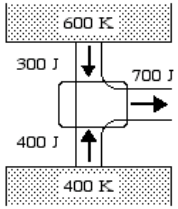

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **there's 700J of work on the substance and then the substance does 700 J of work on the outside world.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Since it is coming from the higher temperature resevoir, the heat transfer is greater than zero.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **The low temperature resevoir is transferring heat at a lower temp than the higher one, and it takes away temp**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **The volume and the pressure does not change at all.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **It is not possible for heat to flow from a cold body to a hot one.**

Could this device possibly function?**no**
Explain: **It doesn't follow the laws of thermodynamics**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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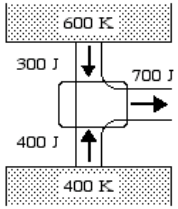

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Heat is transfered in so work is positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **If the working substance increases in heat, it is positive heat transference.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **If the heat is still transfered into the working substance, it is positive.**

Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain. **Since you don't know the change in internal energy, you can't say.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **The heat is transfered from hot to cold.**

Could this device possibly function?**not enough information is given**
Explain: **If the first law of thermodynamics is met, then yes. Since that is not known, this question cannot be answered**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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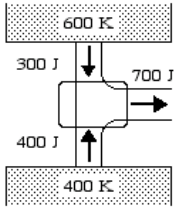

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **I'M really not sure**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **I'm really not sure**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Its greater than room temperature**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **I just dont know.**

Would this device satisfy the second law of thermodynamics? **unanswered**
Explain: **I dont know what the second law of thermodynamics is**

Could this device possibly function?**yes**
Explain: **For sure**

END OF RESPONSE

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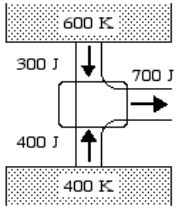

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Because the system does work to the outside world**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Because the heat would be coming out of the system**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Because the heat would also be coming out of the system**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **because energy is conserved from the transfer of heat to mechanical wrok.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **because some of the heat lost from both devices would be lost in the machine to both Qh and Qc, the machine could not be completely efficient.**

Could this device possibly function?**no**
Explain: **since the device violates the the second law of thermodynamics it would not function.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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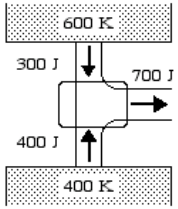

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **From the first law of thermodynamics, the change in energy is negative and the heat transfer is positive so the work done on the substance must be negative**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The high temperature reservoir has more heat to give than the working substance so heat is transfered.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The low temperature reservoir has more heat than the working substance so heat is transfered**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The work is negative and the heat is positive and the change in energy is also negative**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The second law states that no cyclic process can completely change heat into work**

Could this device possibly function?**no**
Explain: **It goes against the second law of thermodynamics**

END OF RESPONSE

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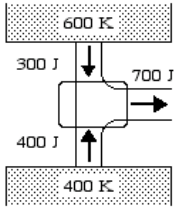

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Because heat is added**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **because its rises in temo**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **because**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Change in energy equals heat - work**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **no idea**

Could this device possibly function?**yes**
Explain: **no idea**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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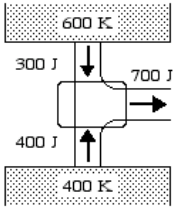

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **If the energy is to remain the same then the work must be negative to account for the increase in heat.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat would be positive because the work would be negative.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Greater heat would come from the reservoir with a greater temperature which would continue into the reservoir of lesser temperature.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Only if the work is negative and the heat is postivive.**

Would this device satisfy the second law of thermodynamics? **unanswered**
Explain:

Could this device possibly function?**no**
Explain:

END OF RESPONSE

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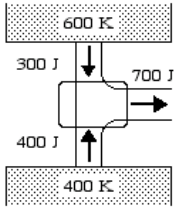

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The work that is done is positive because the force of doing that work moves in the same direction that the energy transfer, heat, displacement move.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **It is losing heat because it is transferring it... thus negative.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Same reason as above.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Yes, delta_U = q -w_done on outside by inside. This is exactly what is happening.**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **No one has yet taught me the second law of thermodynamics--and if they have I have forgotten it.**

Could this device possibly function?**yes**
Explain: **I think so, it satisfies the laws so, yeah!**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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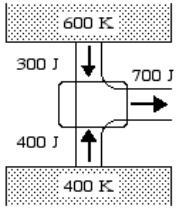

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **direction of motion same as force**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **work is positive**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **work is negative**

Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain.

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **Don't know the 2nd law...**

Could this device possibly function?**not enough information is given**
Explain: **I'm not sure how you would answer this. Perhaps we'll learn about it in recitation this week.**

END OF RESPONSE

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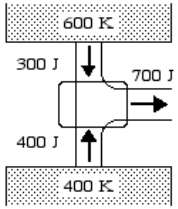

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **if the work done on the substance is the negative integral of the equation then because there is area under the curve the work will be negative.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **same reason as above**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **deltau = Q - W because the work is negative and the Q is positive there will be a positive change in the system which is what the diagram shows.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **the substance would transfer the heat to the colder 400 k unit instead of the two adding together.**

Could this device possibly function?**no**
Explain: **instead of having a thermal motion towards the outside the heat would simply move across to the colder unit and no heat move outward.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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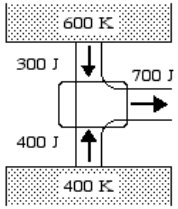

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **700 J is pos**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Q here is pos cause reservoir is doing work on substance**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Reservoir is doing work on substance**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **yes**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **i dont know what the second law is yet**

Could this device possibly function?**yes**
Explain: **i dont know**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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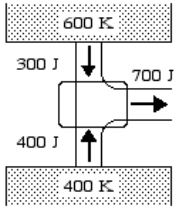


Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **Only heat is transferred, no forces act on the working substance.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Because the question askes about heat transferred from, and heat travels from the reservoirs to the working substance, the transfer from must be positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **As it is designed, the trasfer would be positive because energy is meant to flow into the substance from both reservoirs.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The first law deals with amounts of energy transferred, so if the device worked as designed, the sum of heat transfers, plus the zero for work would amount to the net change in energy.**

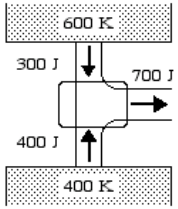
Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **We do not know the temperature of the working substance at the beginning of the cycle. If that substance is signifigantly cold, it could satisfy the second law.**

Could this device possibly function?**not enough information is given**
Explain: **It could function but only if the working substance was either absolutely nonconductive(I think that is impossible) or it was at such a low temperature to begin with that over the time of the cycle it could not raise to a temp greater than that of the current temp of the low temp tank.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **the temp has decreased**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **no**
Explain:

Could this device possibly function?**yes**
Explain:

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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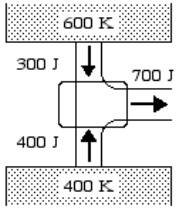

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **don't know**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **heat is passed on**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **not as much heat**

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**yes**
Explain:

END OF RESPONSE

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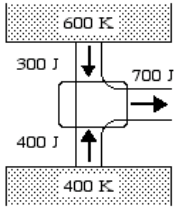

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **Work is not transferred, thermal energy is.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **zero**
Explain: **It is transferring thermal energy**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **It is transferring thermal energy.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **There would be Q transferred, not W.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **entropy will increase as the system goes to equilibrium**

Could this device possibly function?**no**
Explain: **Im not sure what the deviceis even doing, but I dont think it will transfer heat efficiently**

END OF RESPONSE

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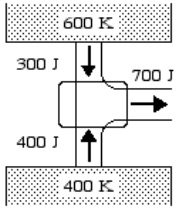

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **It would be zero because the direction is perpendicular to the forces.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The high temperature resevoir would lose some heat to the cooler one.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It is still hotter than the working substance.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **All conditions are satisfied.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **No work would be done.**

Could this device possibly function?**no**
Explain: **No work would be done.**

END OF RESPONSE

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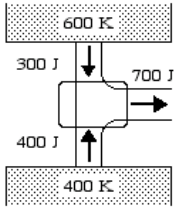

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The work done by the substance is negative so the work done on the substance is positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat is added to the system so it is positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Heat is still being added to the system**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Heat is added to the system so that equals the internal energy of the system**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Heat is transferred from the colder body to the hotter body and work is done.**

Could this device possibly function?**yes**
Explain: **it satisfies both laws of thermodynamics.**

END OF RESPONSE

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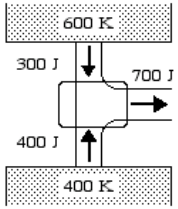

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The work will be positive because the 700J going to the right is positive and the 400J going up cancels out the 300J going down; therefore there will be positive work.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The heat transferred to the working substance the the high temperature reservoir during each cycle would be negative because the 300J of work going downwards is negative therefore the heat transferred would be negative.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The heat transferred to the working substance the the low temperature reservoir during each cycle would be positive because the 400J of work going upwards is positive therefore the heat transferred would be positive.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **This device would satisfy the first law of thermodynamics because the increase in the internal energy of a system is equal to the amount of energy added by heating the system, minus the amount lost as a result of the work done by the system on its surroundings.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **This device wouldn't satisfy the second law of thermodynamics because of the heat transferred and the work beingdone by the device.**

Could this device possibly function?**no**
Explain: **I believe this device couldn't possibly function because it doesn't satisfy the second law of thermodynamics.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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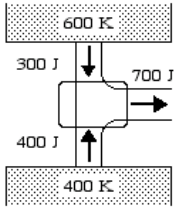

Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**yes**
Explain:

END OF RESPONSE

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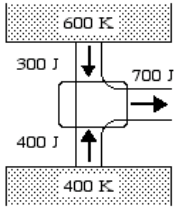

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **According to the 2nd Law of Thermodynamics, the object cannot do positive mechanical work if it stays at the same state.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The high reservoir is giving heat energy to the object.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The low reservoir is giving heat energy to the object.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **It would, but it would not be able to perform work.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **It could not perform any mechanical work.**

Could this device possibly function?**no**
Explain: **It could not perform any mechanical work.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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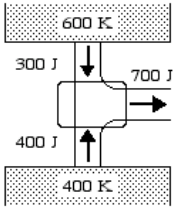

Q1: The work done on the working substance during each cycle would be; **not enough information is given**
Explain : **see 7**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **not enough informaion is given**
Explain: **depends on if the substance is hotter than the resivoirs**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **not enough information is given**
Explain:

Would this device satisfy the first law of thermodynamics? **unanswered**
Explain. **change in U = Q - W... no idea**

Would this device satisfy the second law of thermodynamics? **unanswered**
Explain: **i haven't read that far**

Could this device possibly function?**unanswered**
Explain:

END OF RESPONSE

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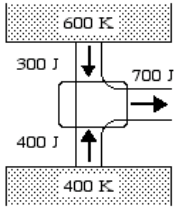

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **KE is being invested in the substance from the reservoirs**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **B/c of the nature of a reservoir, it holds heat to relase.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Based on the arrows indicating, a 400 J dontation, I assume it's going to give E.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **There will be no change to dU b/c the system is closed, doing only work on itself and no heat is added.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **It is asking for a contribution from both reservoirs. Rather than extracting energy from the difference in heats of thre reservoirs.**

Could this device possibly function?**yes**
Explain: **But not as indicated. Some of the heat from the hot reservoir would have to go to the second colder reservoir, then this system would function.**

END OF RESPONSE

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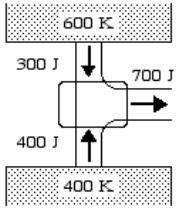

Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain:

Would this device satisfy the first law of thermodynamics? **no**
Explain.

Would this device satisfy the second law of thermodynamics? **no**
Explain:

Could this device possibly function?**no**
Explain:

END OF RESPONSE

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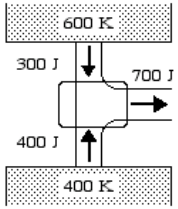

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **without any displacement, the work is zero.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **the heat transferred will be positive because it causes a positive change in internal energy.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **the heat transferred will be positive because it causes a positive change in internal energy.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **no because with the work being zero and the change in internal energy being positive, the heat transferred should be negative.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **because of the difference in signs on the heat transferred and the work.**

Could this device possibly function?**no**
Explain: **this device couldn't possibly function because it simply doesn't make sense.**

END OF RESPONSE

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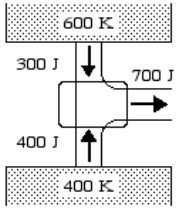

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Because heat or work is being added to the system by the arrows**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Because heat flows from the higher temperature system to the lower one**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **not enough information is given**
Explain: **If the working substance was at an even lower temperature than the substance then it would be positive, but if it was higher then it would be negative.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **because the work and heat both contribute to the equation**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Because it cant just absorb heat and covert that heat completely into mechanical work**

Could this device possibly function?**no**
Explain: **Because it doesn't follow the 2nd law of thermodynamics**

END OF RESPONSE

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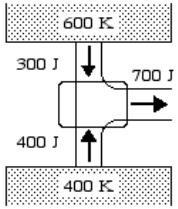

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Force in direction of displacement.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **It will lose to surroundings.**

The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Heat will come into the reservoir.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **It follows all the rules.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Again, follows all the rules.**

Could this device possibly function?**yes**
Explain: **It follows all the thermo laws.**

END OF RESPONSE

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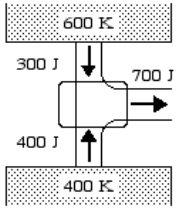

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **The work done is zero because 700 J of work is put into the system and 700 J of work is removed from the system, Win=Wout so the work done is zero.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat transfer would be positive becuase heat is being transfered into the working substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The heat transfer would still be positive becuase heat is being added to the working substance.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **It will satisfy the first law becuase since work is zero, delta U=Q and Q and delta U are both positve in this system.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **It will satisfy the second law because heat is always flowing from hot to cold.**

Could this device possibly function?**yes**
Explain: **This device can function becuase it satisfies both the first and second laws.**

END OF RESPONSE

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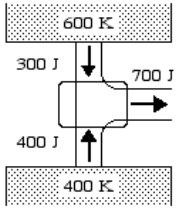

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **More heat would leave because the exit is hotter than the entrance temperatures.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Its lower than the low temperature resevoir.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Its hotter than both other resevoirs.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **Heat and work need to eqaul eachother and they dont.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **I don't know the second law.**

Could this device possibly function?**no**
Explain: **The two resevoirs contributing work have lower temperatures than the resevoir the heat is leaving through.**

END OF RESPONSE

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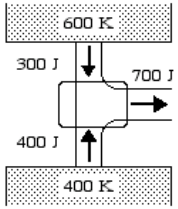

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The substance is gaining energy, so the work done on it must be positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The reservoir is giving energy to the system, so its heat transfer must be positive**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **The reservoir is taking energy out of the system, so its heat transfer must be negative.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **both 'q' and 'w' are positive, so the the change in energy (assuming an isolated system) could be zero, or could gain or lose energy.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Because it involves heat being completely converted into mechanical energy then returning to the same state.**

Could this device possibly function?**no**
Explain: **It violates the second law of thermodynamics, there has to be some heat loss somewhere.**

END OF RESPONSE

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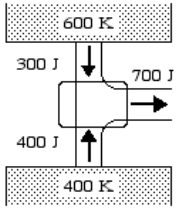

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **Heat in = heat out**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **it's going into the substance**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **same as 7**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **if energy is converted perfectly**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **nada**

Could this device possibly function?**not enough information is given**
Explain: **13**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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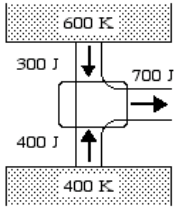


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The work done on the working substance will be positive because although some heat will be lost the work done on that substance will still be positive. because Qh-Qc is still a positive number.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The heat absorbed by the substance is Qh-Qc so the transferred from the high temperature system would actually be negative compared to the heat absorbed by the substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The Qc will be positive because the substance will be absorbing the Qc and a little of it will be wasted but the Qc will still be positive because it is contributing more energy to the substance.**

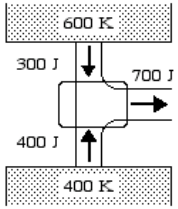
Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The first law of thermodynamics states that U= Q-W and heat and work are being done to the system so the energy in the system is the same so it satisfy's the first law.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The second law of thermodynamics states that the W is equal to Qh-Qc and Qc is outputting more energy than Qh so it does not satisfy the the second law of thermodynamics.**

Could this device possibly function?**no**
Explain: **The heat absored by the substance would Qh-Qc and since the output of Qc is greater than Qh than the system would be absorbing negative heat therefore doing nothing.**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **This device will not function.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat transfer is from the reservoir to the device.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Heat is transferred from the reservoir to the device.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **If it worked it would...**

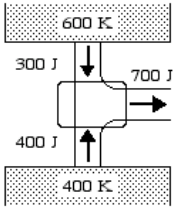
Would this device satisfy the second law of thermodynamics? **no**
Explain: **Some heat must be transferred to the low temp res.**

Could this device possibly function?**no**
Explain: **Could not function.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **Since both temperatures are cancelling out then the work done must be zero**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Since the work heats up the system the temperature would be positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **The low temperature reservoir would be negative since it is cooling down the system**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **yes because the cold and hot balance out through the system.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **no since the temperatures would not equal the previous temps**

Could this device possibly function?**no**
Explain: **No since the temperatures would not work**

END OF RESPONSE

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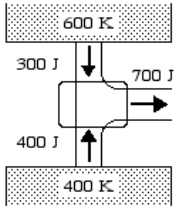

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **since it heats up it is positive**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **this fluid is cooled**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **this fluid is heated**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **it satisfies the law**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **im not really sure what the second law is to be honest.**

Could this device possibly function?**yes**
Explain: **yes since it satisfies the first and second laws**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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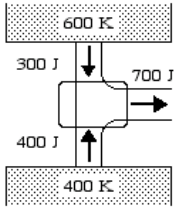

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **since energy is going in and out it will do zero work**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **heat going into the substance would be positive heat transfer.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **it is still going into the system making it positive.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **this does satisfy the first law based on the equation that represents the law.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **yes because it is a function.**

Could this device possibly function?**yes**
Explain: **this could work because it obtains heat and gives it off.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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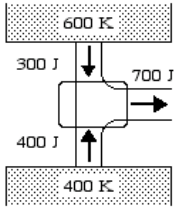

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **All of the heat transferred to the working substance is transferred out.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The high temperature reservoir would raise the temperature of the working substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **The low temperature reservoir would lower the temperature of the working substance.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Delta U would remain constant since Q and W do not change in the cycle.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **All of the heat transferred into the working substance is transferred out.**

Could this device possibly function?**no**
Explain: **It does not satisfy the 2nd law of thermodynamics.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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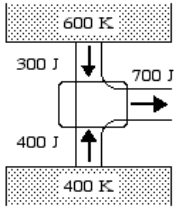

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Since work is being done on the system it will be positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **This will be negative because heat is being transfered from the substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **This will be positive because heat is transferd to the system.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **This will satisfy the first law**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **This will satisfy the second law.**

Could this device possibly function?**yes**
Explain: **this device will function**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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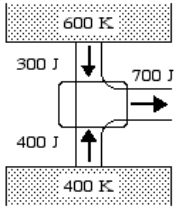

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The work don't is postive because the total work done is a positive number.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat transfer is positive because it helps to raise the temperature**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The heat transfered is positive because it helps to raise the temperature.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Yes, because the internal energy is conserved in the process.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **No, because it is impossible for any process to have its sole result the transfer of heat from a cooler body to a hoter body.**

Could this device possibly function?**no**
Explain: **No, because it needs to satisfy both the first and second laws of thermodynmics to function properly.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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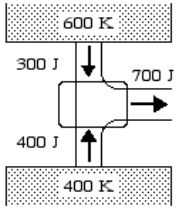

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Work is done on the system. Force in same direction as disp. ?**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Heat is transfered from the resevoir- resevoir losses heat.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Heat is being lost by this resevoir as well.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Energy is conserved**

Would this device satisfy the second law of thermodynamics? **unanswered**
Explain: **Not too sure.**

Could this device possibly function?**yes**
Explain: **Again, not too sure,**

END OF RESPONSE

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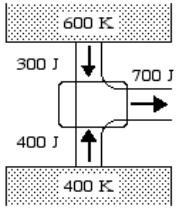

Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **heat is transfered always from high to low temperatures**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **heat is transfered always from high to low temperatures**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **yes because both heat transfer and work occur in this situation**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **because the reservoir absorbed 700J and is outputting 700J therefore the system is ending in the same state it began which dissatisfies the law**

Could this device possibly function?**no**
Explain:

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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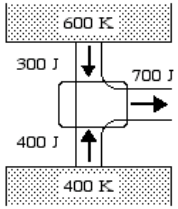

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **There's internal work.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Because there's energy transfered from higher to lower temperature.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Because the energy still transfered from the outside world into the working substance.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Because the energy come in is equal to the energy come out.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Because we can extract energy from two different temperature system.**

Could this device possibly function?**yes**
Explain: **Because it's obey the two laws.**

END OF RESPONSE

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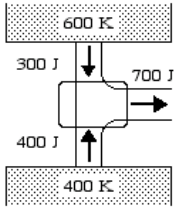

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Heat is added**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Heat is being taken away by the low temp reservoir**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Heat is added by the high temp reservoir**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The internal energy change can be equal to the heat exchanged minus the work done**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **The entropy will increase over time**

Could this device possibly function?**yes**
Explain: **It satisfies both laws**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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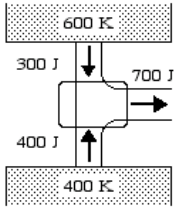

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **gose the way of displacement**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **because it getting warmer**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **because of the pressuer change**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **becaquse newton says so**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **there isnt enought information**

Could this device possibly function?**yes**
Explain: **why not**

END OF RESPONSE

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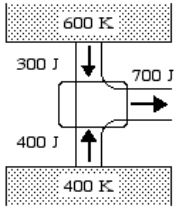

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Bcause it goes in the way of displacement**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **increasing temperature**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **positve it increases**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **yes because ity deos**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **because idk the second law**

Could this device possibly function?**yes**
Explain: **y not?**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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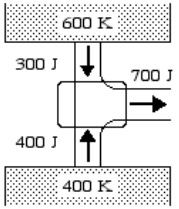

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Heat is going in to the substance.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat is going into the substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The diagram shows that heat is transferred into the substance.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The equation deltaU = Q - W(by the system) would be followed.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **It is 100% efficient according to the diagram and according to the 2nd law of thermo heat transfer cannot be 100% effecient just as a refrigerator or a motor cant.**

Could this device possibly function?**no**
Explain: **It would lose some heat. Its output would not be the 100% effecient 700 joules that is displayed in the diagram. Something similar could function but this could not.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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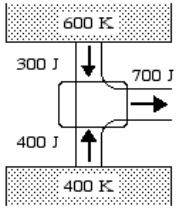

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **because it is in same direction as force**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **losing energy**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **increasing heat**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **conservation of energy**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **not possible for 100% efficiency**

Could this device possibly function?**no**
Explain: **doesn't follow 2nd law of thermodynamics**

END OF RESPONSE

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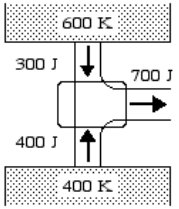

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **pressure volume is positive**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **same direction as displacement.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **it gains heat so its positive**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **it gains heat internally and satisfies the equation**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **i'm not entirely sure.**

Could this device possibly function?**yes**
Explain: **it absorbs heat accordingly so it could function**

END OF RESPONSE

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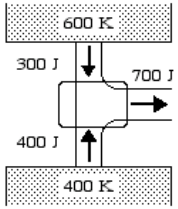

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **the force and displacement are in the same direction**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **the heat transfer has to cancel out with the work done**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **the heat is transferred from the substance to the reservoir**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **the work done and the heat ransfer cancel out to have no change in energy.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **the heat transfer cant be simply transformed into work.**

Could this device possibly function?**no**
Explain: **it does not follow the second law**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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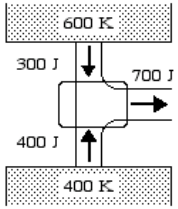


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **It would be positive b/c 1000 are going into the system while only 700 J are leaving it (a positive number)**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The remaining stuff is positive so the stuff that leaves must be negative**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Since the stuff inside is positive, it must also be positive when it receives it**

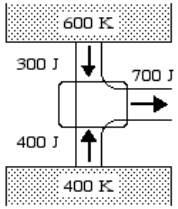
Would this device satisfy the first law of thermodynamics? **yes**
Explain. **All energy is conserved no matter what**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Since the remaining J's are positive then everything is fine.**

Could this device possibly function?**yes**
Explain: **B/c its output is not as big as its input**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **1st law**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The arrows indicate heat transfer**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The arrows indicate heat transfer**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **U + W = Q. There can be positive work and heat transfer**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **It is possible that this device is transforming heat into mechanical energy**

Could this device possibly function?**yes**
Explain: **Yes, but it is not at a thermal equilibrium**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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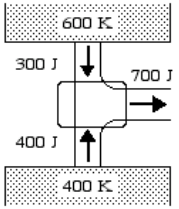


Q1: The work done on the working substance during each cycle would be; **not enough information is given**
Explain : **The initial temperature of the substance needs to be known.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **not enough informaion is given**
Explain: **the temperature of the substance needs to be known**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **not enough information is given**
Explain: **see above**

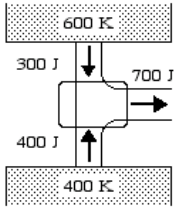
Would this device satisfy the first law of thermodynamics? **yes**
Explain. **an equilibrium can be reached**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **see above**

Could this device possibly function?**not enough information is given**
Explain: **Nothing is known about the substance so we can't tell**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **since the sum of the energy being transfered into and out of the sysem equals zero, no work is done on the system.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **since energy is being transfered into the system, work will be positive**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Since energy is being transfered out of the system, work wil be negative.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Yes, work is equal to the change in energy of the system.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**yes**
Explain: **It is thermodynamically feasable.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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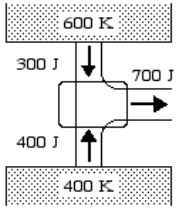

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **for the working substance to have an output, there must be positive work on the substance**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **we can see by the diagram that heat comes into the substance**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **again see diagram**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **for the working substance to be able to do work or have an output of some kind, we must input work or heat to get the required result**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **havent got to it sorry**

Could this device possibly function?**yes**
Explain: **i think it seems to be a reasonable device**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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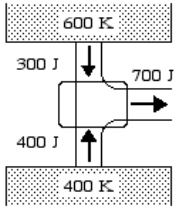

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The force is in the direction of displacement.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **heat flows from hot to cold**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **heat flows from hot to cold**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The heat flow certainly follows the law.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The heat will not work right.**

Could this device possibly function?**no**
Explain: **It would have to follow the second law of thermodymics.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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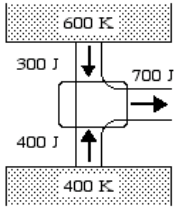


Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **Force and Change in Distance are in the same direction, towards the substance.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **U = q - w, but if U increases (at some amount of work w) then Q must be positive**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **It is still doing positive work, and heat is being trabsfered**

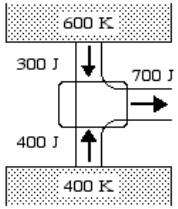
Would this device satisfy the first law of thermodynamics? **yes**
Explain. **As is defined in the picture, no elements are permanent, therefore the system could change values towards thermal equilibrium u = q - w**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Neither heat engine is perfectly efficient.**

Could this device possibly function?**not enough information is given**
Explain: **If it relies on some magical pixy dust to work, it is probably not feasible.**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **there is no force applied to the system so no work.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **the temperature will go up, so the heat transferred would be positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **it is also causeing the heat to go up, so it will also be positive.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **there is a change in the heat transferred and so there will be a change in internal energy.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **the system will end in the same state as it began and there is no mechanical work, so it will satisfy this law**

Could this device possibly function?**yes**
Explain: **it follows both the laws of thermodynamics.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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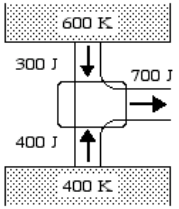

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **energy is being put into the system.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The equillibrium temperature would be lower than that of the high temperature, so the high temperature would transfer positive heat.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **I really don't know.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Nothing disagrees with the first law.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Nothing is out of order.**

Could this device possibly function?**yes**
Explain: **Meets both laws of thermodynamics.... so yes?**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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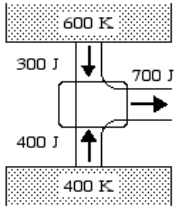

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **no displacement**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **heat added**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **heat is also added**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **there is no work, but there is heat transfer**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **no work is nescessary to transfer heat**

Could this device possibly function?**yes**
Explain: **it follow 1st and 2nd law of T.D.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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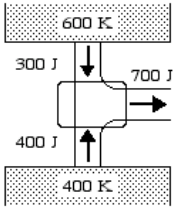

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **Its giving heat to the machine**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **its giving heat to the system**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **same as question 7**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **violates first law**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **idk the second law**

Could this device possibly function?**no**
Explain: **violates first law**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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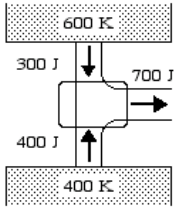

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **I thought the force was in opposite direction as change of phase.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **It gains energy**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **opposite of the last**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Because it follows all the parts of the law.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **it would give off some energy because it isn't perfect.**

Could this device possibly function?**not enough information is given**
Explain: **don't know enough**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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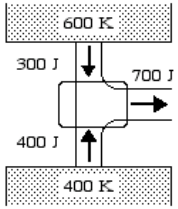

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **If the working substance gains energy, it has positive work done on it.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **zero**
Explain: **All energy that enters the working substance leaves the working sunstance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **same reason as question 7.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **It reaches a state of equilibrium, even after outside forces have changed it.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **If the system does any mechanical work, the system will not end in the same state such that it began in.**

Could this device possibly function?**no**
Explain: **it doesnt satisfy the second law--the same amount of energy that enetered the system cannot leave.**

END OF RESPONSE

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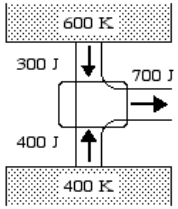

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The substance is being heat up so their has to be posative work**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The system will be loosing heat**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The system will be gaining heat**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Yes, the two different substances are combined to produce a new temperature**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Yes, the system does posative work so there has to be a rise in temperature.**

Could this device possibly function?**no**
Explain: **The two substances combine to produce a temperature that is higher than eather substances origional temperature.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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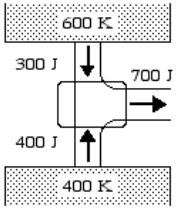

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **heat is transfered to the working substance. there is a positive entropy**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **heat is transfered to the working substance. there is a positive entropy**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **heat is transfered to the working substance. there is a positive entropy**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **U = W + Q**

internal energy increases

Would this device satisfy the second law of thermodynamics? **no**
Explain: **it seems like not all the heat can be transfered**

Could this device possibly function?**no**
Explain: **i don't think that all of the heat from the lower portion can be transfered.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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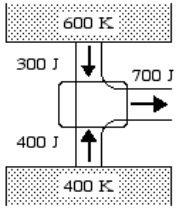

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **700 joules going in and 700 coming out**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **It looses energy when it is melded with the low temperature substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Gains energy (heats up) when melded with the high temperature fluid**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **energy is not lost during the transaction which is improbable**

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**yes**
Explain: **If there was no energy lost within the system**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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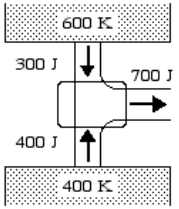


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **there is a +100 work difference between sides**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **the wor must come from the transfer of thermal energy**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **adds up to 700 j of work**

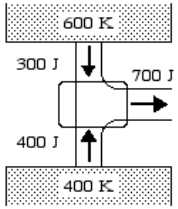
Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain. **need a thermal constant to know if this works**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **not enough energy**

Could this device possibly function?**no**
Explain: **is ciolates the second law**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Guessing!**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **zero**
Explain: **The final direction isn't in the same direction as the heat transfer**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **See Question 7.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **I don't know**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **I don't know**

Could this device possibly function?**unanswered**
Explain: **I don't know**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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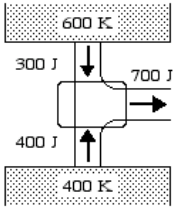


Q1: The work done on the working substance during each cycle would be; **unanswered**
Explain : **I didn't answer**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **unanswered**
Explain: **If the liquid from the two resivoirs reaches equilibrium before the working liquid then it will transfer no heat.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **unanswered**
Explain: **Same as above: it would be negative if the two liquids haven't reached equilibrium before reaching the working liquid**

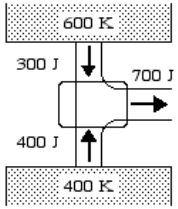
Would this device satisfy the first law of thermodynamics? **yes**
Explain. **it would**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **sure**

Could this device possibly function?**yes**
Explain: **It all depends on the material that the device is built out of.**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Because heat is being transfered TO the substance FROM the device, the device is doing positive work on the substance.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat is being ADDED TO the substance; heat is transferring INTO the substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **IF "low temperature" implies the reservoir is at a lower temperature than the substance, then heat is transferring OUT OF the substance.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Heat is transff**

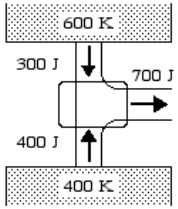
Would this device satisfy the second law of thermodynamics? **999**
Explain:

Could this device possibly function?**999**
Explain:

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **negative**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **no**
Explain:

Could this device possibly function?**no**
Explain:

END OF RESPONSE

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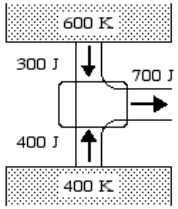

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Not sure, it just looks like it acts in the same direction as force.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The high temperature reservoir is greater heat than the working substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **The heat of the low temperature reservoir is less than the working substance.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **I don't know.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **I don't know.**

Could this device possibly function?**no**
Explain: **I don't know.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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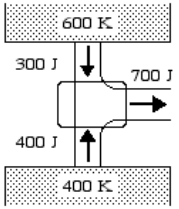

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **heat is being transferred into the the working substance so work is done.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **heat is transferred from a higher temperature object to a lower temp.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **the working substance has a lower temp than the low temp reservoir so it will be positive.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **if positive work is done, positive heat transfer must occur to make internal energy equal**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **the heat is transferred from high to low**

Could this device possibly function?**yes**
Explain: **heat is transferred so the device can function.**

END OF RESPONSE

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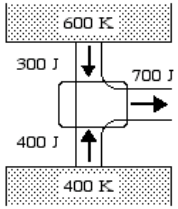

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Increased energy, increased work**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **heat energy is leaving the reservoirs**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **some heat energy would enter the cooler fluid**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **would not allow reservoirs to be different temperature for too long before equilibrium is reached**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **energy**

Could this device possibly function?**not enough information is given**
Explain: **depends on its function**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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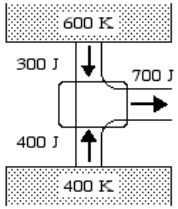

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Energy is put into the substance.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Energy is put into the sbustance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It is putting energy into the substance.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The energy of the substance increases from the work that is done to it.**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain:

Could this device possibly function?**not enough information is given**
Explain:

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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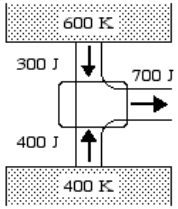

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Because the heat coming out is greater than the heat coming in.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Because it is going from a high heat to a low heat place.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **Because it is the same as the reservoir.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **Because the heat out put is greater than the input.**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain:

Could this device possibly function?**no**
Explain: **because the energy output is greater than the input.**

END OF RESPONSE

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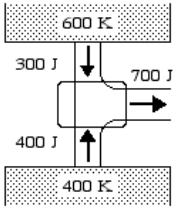

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **We would have to do work on the substance so it can put out heat and energy.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **It is hotter at the resevoir than at the substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **It is hotter at the substance than the resevoir.**

Would this device satisfy the first law of thermodynamics? **unanswered**
Explain. **WAT**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **yo no se.**

Could this device possibly function?**no**
Explain: **would have to be 100 percent efficient.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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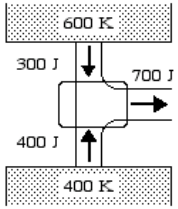

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **I would probabaly use the 1st Law of Thermodynamics**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat transfer would be positive because the 1st law of thermo again.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **1st Law of Thermo**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **I believe it would.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **I'm not sure what the second law of thermo is but sure...**

Could this device possibly function?**yes**
Explain: **I think it could because of the first law of thermo. Change in internal energy = Heat Transfer - Work**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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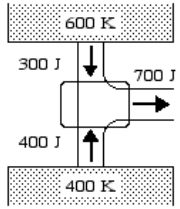

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The forces and distance are both positive**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The forces and displacements are in the same direction**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The forces and displacements are both in the same direction**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The internal energy must be conserved, so internal energy = heat - the work**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The work and temperatures do not match up**

Could this device possibly function?**no**
Explain: **It does not satisfy the second law of thermodynamics and thus cannot exist**

END OF RESPONSE

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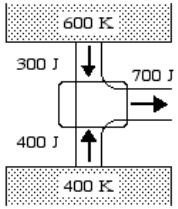

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **its going up**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **its going down**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **its not doing anything**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **because it does.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **because it doesn't**

Could this device possibly function?**yes**
Explain: **if you emit delta omega rays into it, making it heat up super fast, then pour liquid nitrogen and cool it down like a plane crash, then it will work.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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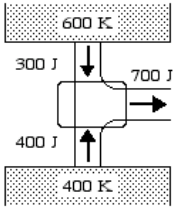

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **the force is in the same direction as the displacement. ?**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **heat is being added to the substance so Q is positive, but U has to be constant so work myst be negative.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Q is negative and U is constant, so W must be positive.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **because i said so.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **U=Q-W**

Could this device possibly function?**yes**
Explain: **because it satisfies the first and second laws of thermodynamics, according to my ablove answers, but I don't really believe it, but I don't know why, so I'm just gonna go with it.**

END OF RESPONSE

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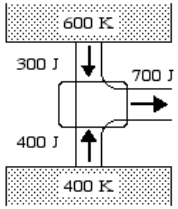

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **the flow of heat is perpendicular to the flow of heat out of the device so the work would be zero**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **the device is at a lower temp than the surrounding resoviors so heat will flow into the device**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **still because 400K is still more heat than the deivce has**

Would this device satisfy the first law of thermodynamics? **999**
Explain.

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **the heat transfer would have to equal the internl energy of the device and it does**

Could this device possibly function?**yes**
Explain: **I am not sure, i dont really see what it is even suppose to be doing.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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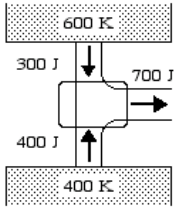

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **There would be a loss in energy which is used in positive work**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **It would be positive because it is losing heat which is used in doing work**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **Heat flows from the positive to the negative resavoir using what is left to do work**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **All of the energy in the system is conserved**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **All of the energy is conserved in the system**

Could this device possibly function?**no**
Explain: **This is an ideal engine one that could not possibly function in the real world.**

END OF RESPONSE

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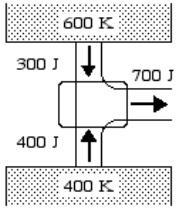

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Positive, because the work being put out by the engine is positive, so it must have positive work done on it.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The high temperature reservoir is putting heat into the system by 300 J.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The heat will move from areas of high heat to areas of low heat, and so heat will transfer out of the system to the low temperature reservoir.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **There will be no change in internal energy, so the work must equal the heat transferred.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **Heat is being transferred to the engine from both the hot and cold reservoirs, and there is no evidence of heat flowing from the hotter to colder body.**

Could this device possibly function?**no**
Explain: **The second law of thermodynamics is not followed. There is negative work being done, and not positive work.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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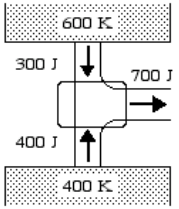

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **This is because the temperature would decrease but the integral will be positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Because the temperature would go down and that means it would be negative.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **Since the temperature would remain the same.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Because the pressure and the volume are seperate from the pressure.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Since this would create a change in the temperature but also level off to equal temperature.**

Could this device possibly function?**no**
Explain: **Since the work combined wouldn't be equal to the sum of the two.**

END OF RESPONSE

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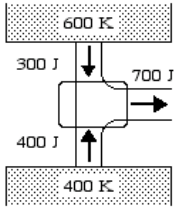

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **Work done on the substance must be zero because there seems to be no change in pressure in the system.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat goes into the substance from the reservoirs, as seen by the directions the arrows point.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **700 J of energy need to come from the working substance. That means 700 J must first go in. Thus, both the 300 J and 400 J must be positively transferred to the substance.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Because there is not real change in state, there is no change in internal energy. Thus, the system internal energy must never fluctuate, which works by the outcoming and incoming heats cancelling each other out.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **No object works at a 100 percent efficiency. If 700 J is put in, the entire 700 J cannot be sent out.**

Could this device possibly function?**no**
Explain: **Because the second law of thermodynamics is not satisfied, there is no real-life situation of which this device could be made to work the way it is described.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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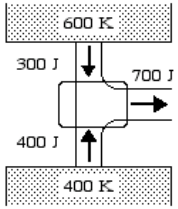

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **the substance flows in the direction of the force**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **heat from the others are transferred into it giving it positive heat transfer**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **the heat from the low temperture transfers with the other one so it loses heat havin negtive transferred to it**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The change in internal energy is the heat minus the work**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **clearly**

Could this device possibly function?**yes**
Explain: **it follows the laws of thermodynamics**

END OF RESPONSE

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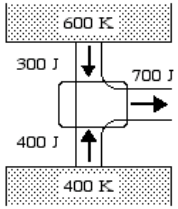


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **arrow in direction of substance**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Positive because there is positive work done**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Positive because there is positive work done**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **yes it does**

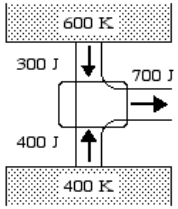
Would this device satisfy the second law of thermodynamics? **yes**
Explain: **yes it does**

Could this device possibly function?**yes**
Explain: **work output is greater than input**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **it looks like the energy moves through unresisted**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **zero**
Explain: **700 goes in, 700 goes out**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **see above answer**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **there must be a change in energy**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **doesnt say if its an isolated system**

Could this device possibly function?**no**
Explain: **nothing can perfectly transfer all of its energy**

END OF RESPONSE

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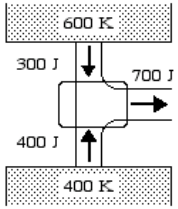

Q1: The work done on the working substance during each cycle would be; **negative**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain:

Would this device satisfy the first law of thermodynamics? **no**
Explain.

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**no**
Explain:

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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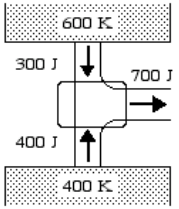

Q1: The work done on the working substance during each cycle would be; **positive**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain:

Would this device satisfy the first law of thermodynamics? **no**
Explain.

Would this device satisfy the second law of thermodynamics? **unanswered**
Explain:

Could this device possibly function?**unanswered**
Explain:

END OF RESPONSE

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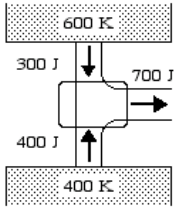

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Because the force is in the same direction as the motion**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Because it would give heat to the other substance**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It would gain heat from the other substance**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Because the equation works out propperly**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **I don't know which law is being referenced.**

Could this device possibly function?**yes**
Explain: **It satisfies the first law of thermo dynamics**

END OF RESPONSE

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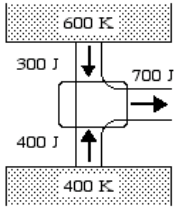


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **i just guessed**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **high temp to low temp**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **low temp to high temp**

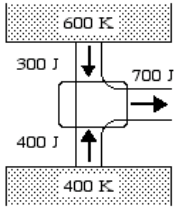
Would this device satisfy the first law of thermodynamics? **yes**
Explain. **delta U + W= Q**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **i do not know the 2nd law**

Could this device possibly function?**not enough information is given**
Explain: **i do not understand the nature of the device.**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **The work done will be zero because 700J of work is done on the system, and that 700J is done by the system on the working substance.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **It would be negative because it would be losing heat.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It would be positive because it would be gaining heat.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The device would satisfy the first because the total change in internal energy would be satisfied by the work and heat transfer of each.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **It satifies the second law because the equations are balanced.**

Could this device possibly function?**yes**
Explain: **Since it satisfies both laws of thermodynamics, it should funtion.**

END OF RESPONSE

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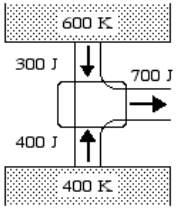

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **There is an increase in energy**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Again, positive increase in energy**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Positive transfer in energy to from the low temperature**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **There is more energy at the end than at the beginning**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **same as 11**

Could this device possibly function?**no**
Explain: **violates first and second laws of thermodynamics**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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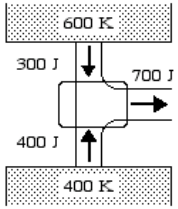

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **The work must be positive because it will move in a positive direction.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat will transfer from the high temperature reservoir to the object so the transfer will be positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **It will be negative because it will absorb heat.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The heat added to the system will either cause work or raise the temperature of the system.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **since entropy of the system is increasing after the work is accomplished.**

Could this device possibly function?**yes**
Explain: **It satisfies both laws of thermodynamics.**

END OF RESPONSE

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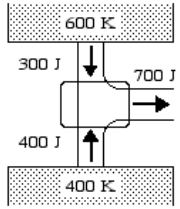

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Because both reservoirs are transferring heat which creates work on the working substance.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Since both of the reservoirs are higher in temp., they will transfer heat to the working substance and cause it to heat up.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It's still a higher temp. than the working substance so it will transfer positive heat.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **It is a function of the variables P, V, N, T so it works for the first law of thermodynamics.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **I'm not really sure why ... I don't know the second law of thermodynamics.**

Could this device possibly function?**yes**
Explain: **Since it satisfies both laws of thermodynamics it should function just fine.**

END OF RESPONSE

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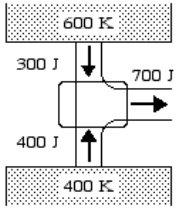

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The resevoirs each do work on the device, so it's positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **No heat goes from the device to the resevoirs.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Again, no heat goes from teh device to the resevoir.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **No change in energy**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **The heat always travels to the lower temperature area.**

Could this device possibly function?**not enough information is given**
Explain: **We don't know the temerture of the device, and the two resevoirs aren't at equilibrium with each other.**

END OF RESPONSE

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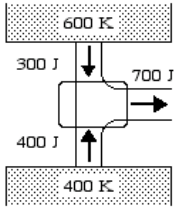

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **losing heat**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **it loses some, it starts with 1000 and ends up with 700**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **same as above**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **im not sure**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **guess**

Could this device possibly function?**yes**
Explain: **who knows**

END OF RESPONSE

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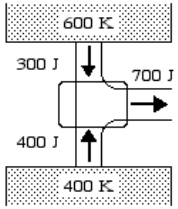

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **more work from the 400k reservoir**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **energy is transferred to the substance**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **energy is transferred to the substance**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **work is done by the two reservoirs**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **Q=W both reservoirs do work**

Could this device possibly function?**yes**
Explain: **it satisfies both laws**

END OF RESPONSE

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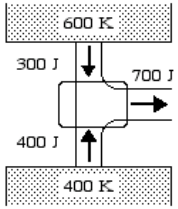

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Because of the change in pressure and volume**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat will be transferred from the warmer substance to it**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **There is no heat able to go down there**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **It goes by thermal equilibrium**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **The Pressure and volume are inversely proportional. Along with the heat. So it works with the equation**

Could this device possibly function?**yes**
Explain: **The heat from each reservoir would combine in the middle at an equiblibrium and work.**

END OF RESPONSE

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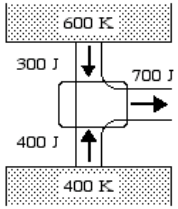

Q1: The work done on the working substance during each cycle would be; **not enough information is given**
Explain : **My intuition is that no work would be done, but there seems to be a lack of information as there seems to be nothing to do any work. All that appears to be going on in the problem is heat transfer.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **At least some of the heat from the reservoirs will be trasfered to the working substance so it's Q has to be positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Since the working substance is in contact with the two reservoirs it's temperature should equalize somewhere between the two. Thus it's temperature will be higher than the lower temperature reservoir so it will transfer heat to that reservoirs.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **I certainty hope so.**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **Clueless.**

Could this device possibly function?**no**
Explain: **I certainly don't think so, it seems it would be ever difficult to get any work out of this system.**

END OF RESPONSE

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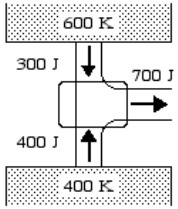

Q1: The work done on the working substance during each cycle would be; **not enough information is given**
Explain : **I cant understand what the diagram is trying to show at all.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **the hot resivoir would increase the temp of the substance**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **the water from the resivoir would absorb some heat from the substance**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **Two low temperatures combined cant create a higher temperature**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **i dont know what the second law of thermodynamics is and i have no way of knowing at this point**

Could this device possibly function?**yes**
Explain: **If work was done from the outside on the substance**

END OF RESPONSE

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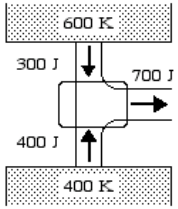

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The device is giving the substance energy.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The device is gaining energy.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It is still giving it heat energy.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **There is nothing to indicate that it isn't.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **There is no increase in entropy.**

Could this device possibly function?**no**
Explain: **disobeys the second law**

END OF RESPONSE

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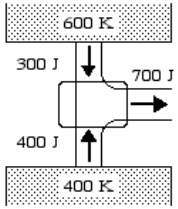

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **The work done would be negative because the 600k is putting more force on the 400 k therefore pushing the force back and putting the work in the wrong direction.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Positive heat is transfered from both reservoirs therefore making the total temperature positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Positive,because the heat will mix in from the hotter reservior.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **yes the first law would be satisfied because the heat all goes one direction.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **If it satisfies the first it satisfies the 2nd.**

Could this device possibly function?**no**
Explain: **No because the is too much force being pushed back on the 2nd reservior making negative and the system wil not go in the correct direction.**

END OF RESPONSE

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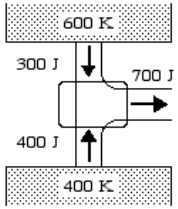

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **because force and displacement are in the same direction.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Because the Q would have to be negative.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Because the Q would have to be positive.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **I don't know why, but I think that it would.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **I think that it would be able to, but not sure why yet.**

Could this device possibly function?**not enough information is given**
Explain: **I would need to know more about the system to determine this answer.**

END OF RESPONSE

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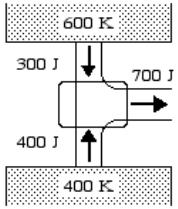


Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **1000 K are inputted and 700 J are outputted**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **the high temperature does positive work**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **for the total work to be negative the low temp would have to do negative work**

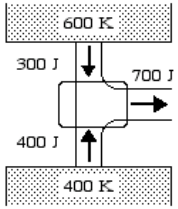
Would this device satisfy the first law of thermodynamics? **no**
Explain. **this apparatus does not work**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **this apparatus does not work**

Could this device possibly function?**no**
Explain: **it does not satisfy the first or second law of thermodynamics**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **The energy is traveing in a 90 deg angle to the heat being forced into the system, therefore work should be a zero value.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat transfered from the high temperature reservior is an easier way to travel so therefore the the work will be positive because that is the direction that the heat wants to travel from the heat force being applied to it.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Heat wants to go into the cold reservior, therefore the force of the movement of the heat is going in the opposite direction from the expected travel and thus the work is negative.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **the energy change in the system is changing and so is the heat. SInce the heat leaves the system the work must add to a positive value to make the change in energy at least equal to zero.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The system puts out the same amount of heat work that it takes in which is not possible because some heat will be lost to the system doing work.**

Could this device possibly function?**no**
Explain: **The heat is mostly coming from the colder reservior which is not going to happen as the heat is going to want to flood into the reservior, not escape from it.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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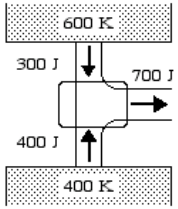


Q1: The work done on the working substance during each cycle would be; **not enough information is given**
Explain : **it does not specify how the energy effects the object**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **endothermic, the object is absorbing heat**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **again endothermic**

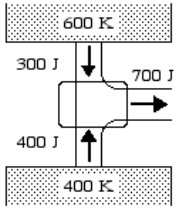
Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain. **you dont know anything about the object into which the heat is transfered**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **you dont knwo anything about the object into which the heat is transfered**

Could this device possibly function?**yes**
Explain: **why not?**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Since the work is done the substance it will have more force (pressure) and the volume increases as well so the work is positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat is being added to the substance and therefore it is positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Heat is still being transferred to the substance and so it is positive.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Heat is being added and so is work and works well with the first law.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **It would work for the second law as well because if it obeys the first law then it has to obey the second law as well.**

Could this device possibly function?**yes**
Explain: **The first and second laws of thermodynamics are obeyed and therefore this device has to function properly.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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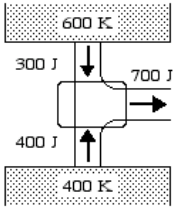

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **an external source of energy is using energy on the working substance**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **positive work, positive heat transfer**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **although it is a lower temperature, energy is still released**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **300 J and 400 J go in and 700 J go out.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **?**

Could this device possibly function?**yes**
Explain: **?**

END OF RESPONSE

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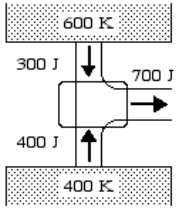

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The force and direction are in the same direction.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The work would be positive because heat is absorbed by the working substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Work is always positive for this device.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **The first law of thermo contradicts this device.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **It could work.**

Could this device possibly function?**no**
Explain: **It would have to agree with both laws of thermo.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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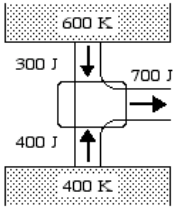


Q1: The work done on the working substance during each cycle would be; **not enough information is given**
Explain : **depends on if the object moves and what direction**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **not enough informaion is given**
Explain: **same as above**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **moving in the direction of the work and displacement.**

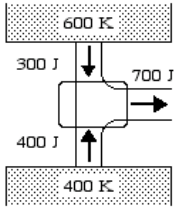
Would this device satisfy the first law of thermodynamics? **yes**
Explain. **sure**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **this week is about the second law.**

Could this device possibly function?**not enough information is given**
Explain: **I don't know much about devices of this sort. It may or may not work.**

END OF RESPONSE

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **force is in same direction as the displacement**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **loses heat**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **gains heat**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **satisfies the law**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **doesn't satisfy the law**

Could this device possibly function?**no**
Explain: **doesn't satisfy the second law**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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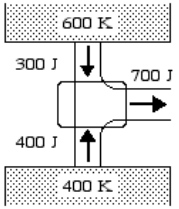

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **The diagram indicates 700J flowing out of the device, indicating that the overall work done on the substance is negative. This is because it opposes the direction of the force.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Heat flows from areas of higher temperature to areas of lower temperature.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **Again, heat flows from areas of higher temperature to areas of lower temperature.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **dU=dQ+pdV The thermal energy transferred via heat into the system would either flow out as work.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **The total energy that leaves as work (700J) is less than the total amount of energy in the two reservoirs (1000J)**

Could this device possibly function?**no**
Explain: **The diagram shows it having 100% efficiency. In the real world that is impossible.**

END OF RESPONSE

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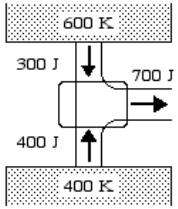

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Heat is converted into positive work put into the system.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **Here, heat is converted into positive work as if from an engine.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Here, heat is absorbed into negative work as if from a refrigerator.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Yes - in this system, U does equal Q plus W.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The 700 J would not be a possible work becuase the work from the hot resevior would be out and the cool resevior would be in.**

Could this device possibly function?**no**
Explain: **The two works conflict with each other.**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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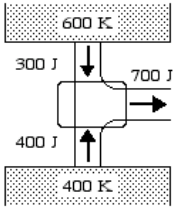

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **The work done is negative because the heat transferred from cooler temperature is greater than the heat transferred from the higher temperature, so the work done is negative.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The heat transferred from the higher temperature is less than the heat transferred from the lower temperature, therefore the heat transferred is negative.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The heat transferred from the lower temperature is greater than the heat transferred from the higher temperature, therefore the heat transferred is positive.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The first law of thermodynamics states the change in internal energy of a system equals the heat added to the system minus the work done by the system, therefore the device will satisy the first law of thermodynamics.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The second law of thermodynamics is it is impossible for a process to have as its sole result the transfer of heat from a cooler to a hotter body, so this device does not satisfy this statement.**

Could this device possibly function?**no**
Explain: **This device does not satisfy the second law of thermodynamics, therefore this device does not function.**

END OF RESPONSE

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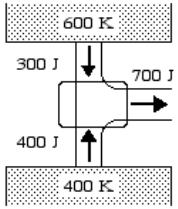

Q1: The work done on the working substance during each cycle would be; **not enough information is given**
Explain : **cant understand the diagrame**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **the resavoirs will give up heat energy**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **it will loss heat energy**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **heat is transeferd**

Would this device satisfy the second law of thermodynamics? **unanswered**
Explain: **dont understand that law yet**

Could this device possibly function?**not enough information is given**
Explain: **dont know what the function would be**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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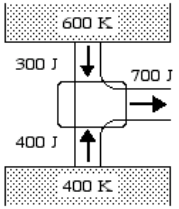

Q1: The work done on the working substance during each cycle would be; **not enough information is given**
Explain : **I just don't know.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **unanswered**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **unanswered**
Explain:

Would this device satisfy the first law of thermodynamics? **unanswered**
Explain.

Would this device satisfy the second law of thermodynamics? **unanswered**
Explain:

Could this device possibly function?**unanswered**
Explain:

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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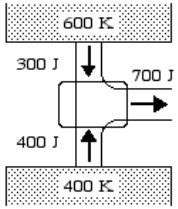

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **There is 700J going in and 700J going out**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **there is more heat going in the top**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **There is less heat going in the lower one**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The same amount of heat goes in as out**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **There is no heat lost**

Could this device possibly function?**yes**
Explain: **It does not violate either law**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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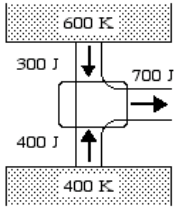

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **heart will flow from the 600k to the 400k**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The reseviour is the hottest**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **the reseviour is the coldest**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **all systems must obey this law**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **the temerature will try to equalize and so work will be done as heat goes from 600k to 400k**

Could this device possibly function?**yes**
Explain: **yes since heat will transfer from hot to cold**

END OF RESPONSE

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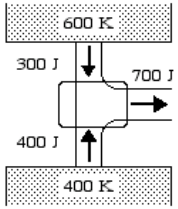

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **It looks like work is being done, but not negative work.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **It seems pretty positive**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **I'm really not sure at all, I don't understand the questions.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **999**
Explain:

Could this device possibly function?**999**
Explain: **It just looks like it would**

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

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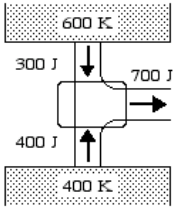

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **your putting heat energy into it, so pos.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **pos energy gain on the working substance**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **pos energy gain on the working substance**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **it depends on the heat temp. raised must equal the intern al energy plus the work the system does**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **as long as the working substance does not convert the heat completely to mechanical energy.**

Could this device possibly function?**yes**
Explain: **any thing is possible**

END OF RESPONSE

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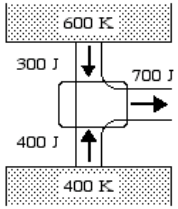

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **More heat going in**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **More heat going out**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **More heat going in**

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**yes**
Explain:

END OF RESPONSE

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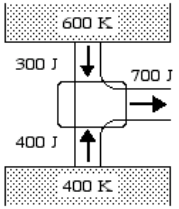


Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **the temp. is increasing**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **the temp. is increasing**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain:

Would this device satisfy the first law of thermodynamics? **999**
Explain.

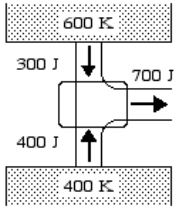
Would this device satisfy the second law of thermodynamics? **yes**
Explain:

Could this device possibly function?**yes**
Explain:

END OF RESPONSE

Pretest (SLT) *University of Colorado. Boulder*

An inventor plans to build a device represented by the diagram shown to the right. The device will operate between reservoirs at 600OK and 400OK. The numbers and arrows indicate heat that will be transferred to the working substance or work that will be done on the working substance during each cycle. It may or may not be possible for this device to actually function.



Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **because positive work is being done by each of the resevoirs to move the substance**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **because the hotter resevoir is at a higher temperature and so is adding heat energy to the working substance in an attempt to reach equilibrium**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **Because the low temperature resevoir is cooler than the working substance and so will be taking energy from the working substance as the two substances move toward equilibrium**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **Because the diagram shows both the high and low temperature resevoirs giving energy to the working substance and the low temperature resevoir giving more heat energy than the high temperature resevoir, which is contrary to the first law of thermodynamics that says heat flows to areas of lower heat energy**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **because the second law states that entropy increases in an isolated system and this system has has more heat energy in a smaller space, which means there are more, faster moving particles in a smaller space, which causes an increased entropy**

Could this device possibly function?**no**
Explain: **it does not satistfy the first law of thermodynamics**

END OF RESPONSE

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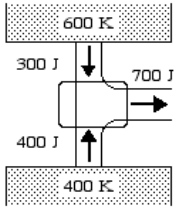

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **Heat is transfered into the substance.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **It doesn't give it's full temeperature.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **zero**
Explain: **The amount of heat given is the same as it is.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **I guessed**

Would this device satisfy the second law of thermodynamics? **unanswered**
Explain: **I don't know the second law.**

Could this device possibly function?**unanswered**
Explain: **Again i don't know**

END OF RESPONSE

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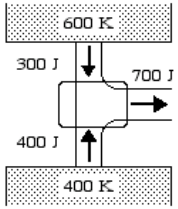

Q1: The work done on the working substance during each cycle would be; **zero**
Explain : **The work done on the working substance is zero because there is no displaement and W=Fd**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat transferred would be positive because heat is being added to the working substance.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **The low temperature reservior should have a lower temperature than the working substance, so the reservious will be taking heat away.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **The first law of thermodynamics states that U= Q-W. W=0, and Q is postive, so change in U increases.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **The second law of thermodynamics states that heat cannot spontaniously flow from one device to another without work input. Becuase there is no work, it doesn't satisfy the second law.**

Could this device possibly function?**no**
Explain: **It doesn't satisfy the second law of thermodynamics.**

END OF RESPONSE

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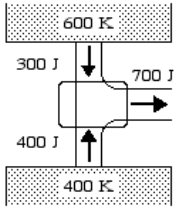

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **There is a total of 1000K transferred to the substance, but only 700J leaving it. Thus, it is gaining heat, and thus the work is positive.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **The heat leaving the reservoir is negative; the heat entering the substance is positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **The heat leaving the reservoir is negative; the heat entering the substance is positive.**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **The heat entering is greater than the heat leaving.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **More heat is entering the substance than leaving it; thus its internal energy is increasing.**

Could this device possibly function?**yes**
Explain: **Yes, it could function for some period of time. Eventually, however, the heat would become too great.**

END OF RESPONSE

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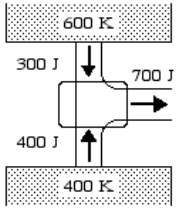

Q1: The work done on the working substance during each cycle would be; **not enough information is given**
Explain : **It depends on the state of volume of the working substance, and the volume of the reservoirs.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **not enough informaion is given**
Explain: **It depends on which has a lower energy. Heat flows from highest so lowest temperature-areas.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **If the reservoir is lower temperature, then the heat transfer would be to the reservoir from the substance.**

Would this device satisfy the first law of thermodynamics? **not enough information is given**
Explain. **It depends on the states of the substances, the volumes, and the relative energy of the substance.**

Would this device satisfy the second law of thermodynamics? **not enough information is given**
Explain: **It depends on what the second law of thermodynamics is. I haven't found out yet.**

Could this device possibly function?**yes**
Explain: **Quite possibly, though undetermined.**

END OF RESPONSE

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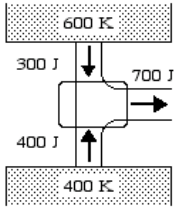

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **the net h is less than what is put in**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **pos work must be done**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **there must be a net h applied**

Would this device satisfy the first law of thermodynamics? **no**
Explain. **there must be a net h appled**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **not in equilibrum**

Could this device possibly function?**no**
Explain: **not with out a net h**

END OF RESPONSE

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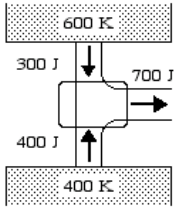

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **The energy used adds up, therefore I would assume that it's positive**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **since the temperature goes down, the work should be negative.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **since more energy is put into the working substance from the low temperature to raise its temperature the work would be positive.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **yes because everything is conserved since it only transfers from one to another yet the net should stay the same.**

Would this device satisfy the second law of thermodynamics? **unanswered**
Explain: **I'm not sure what the second law is, I haven't had the chance to read the textbook yet.**

Could this device possibly function?**yes**
Explain: **There seems to be no reason why it wouldn't work.**

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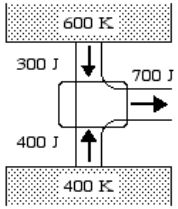

Q1: The work done on the working substance during each cycle would be; **negative**
Explain :

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain:
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain:

Would this device satisfy the first law of thermodynamics? **yes**
Explain.

Would this device satisfy the second law of thermodynamics? **no**
Explain:

Could this device possibly function?**yes**
Explain:

END OF RESPONSE

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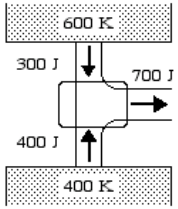

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **It goes into the substance.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **negative**
Explain: **Work goes into heat.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It goes into the substance.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **dU = dQ - dW**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **No perfect transfer.**

Could this device possibly function?**no**
Explain: **Second law of thermodynamics.**

END OF RESPONSE

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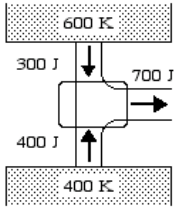

Q1: The work done on the working substance during each cycle would be; **positive**
Explain : **work is required to keep heat transferring while the two sources are reaching equilibrium.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **heat will go from high to low until it reaches equilibrium. high temp reservoir is still above equilibrium so the heat transferred is positive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **heat will go from high to low until it reaches equilibrium. low temp reservoir is still below equilibrium so the heat transferred is negative.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **Positive change in energy requires a positive heat transferred plus work. Both of these are satisfied.**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **entropy is increasing until equilibrium. In this case, entropy is increasing because energy transfer is becoming more disordered because temperature is transferring between multiple sources.**

Could this device possibly function?**yes**
Explain: **It satisfies the laws of thermodynamics**

END OF RESPONSE

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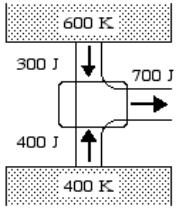

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **Heat is being lost**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **The heat is being transferred to the main working body**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **negative**
Explain: **The low temperature is taking away heat.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **There is a change in heat**

Would this device satisfy the second law of thermodynamics? **yes**
Explain: **All the heat would even out**

Could this device possibly function?**yes**
Explain: **The device is transferring heat**

END OF RESPONSE

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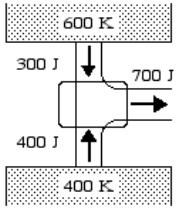

Q1: The work done on the working substance during each cycle would be; **negative**
Explain : **Work done by substances is negative while on is positive as defined in our text. Therefore, we can say that this is going to be negative.**

The heat transferred to the working substance from the high temperature reservoir during each cycle is: **positive**
Explain: **We're gaining heat transfered in the system on the high temperature side, therefore it must be postive.**
The heat transferred to the working substance from the low temperature reservoir during each cycle is: **positive**
Explain: **It is coming to thermal equilibrium, so it will rise as shown by the arrows.**

Would this device satisfy the first law of thermodynamics? **yes**
Explain. **We are putting internal energy and raising it, therefore when Q is positive and W is negative, then it will cause for U to be extremely positive.**

Would this device satisfy the second law of thermodynamics? **no**
Explain: **It is impossible for all of the heat to transfered to process internally, therefore some of the Qh is used to cool down the system.**

Could this device possibly function?**no**
Explain: **By disobeying the 2nd Law of Thermo.**

END OF RESPONSE