

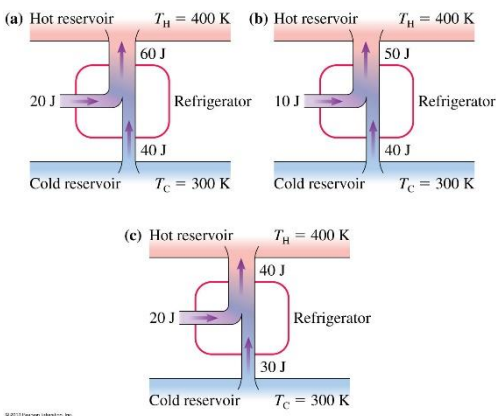
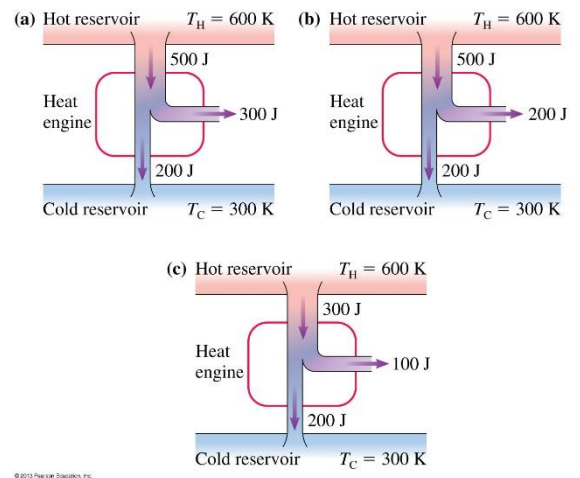
AP 2 Thermodynamics WS 6

Name: _____ Period: _____



The fact that you can remember yesterday but not tomorrow is because of entropy. The fact that you're always born young and then you grow older, and not the other way around like Benjamin Button - it's all because of entropy. So I think that entropy is underappreciated as something that has a crucial role in how we go through life. -- Sean M Carroll

- Which, if any, of the heat engines in the figure on the right violates (a) the first law of thermodynamics or (b) the second law of thermodynamics? Explain.



- Which, if any, of the refrigerators in the figure on the left violates (a) the first law of thermodynamics or (b) the second law of thermodynamics? Explain.

- If an engine does 200 J of net work and exhausts 600 J of heat per cycle, what is its thermal efficiency?

4. A heat engine does 10 J of work and exhausts 15 J of waste heat during each cycle. A) What is the engine's thermal efficiency? B) If the cold-reservoir temperature is 20°C, what is the minimum possible temperature in °C of the hot reservoir?

5. A gasoline engine has a thermal efficiency of 28%. If the engine absorbs 2000 J of heat in each cycle, (a) what is the net work output in each cycle? (b) How much heat is exhausted in each cycle?

6. A heat engine with a thermal efficiency of 20% does 800 J of net work each cycle. How much heat per cycle is lost to the surroundings (the low-temperature reservoir)?

7. An internal combustion engine with a thermal efficiency of 15.0% does 2.60×10^4 J of net work each cycle. How much heat is lost by the engine in each cycle?

8. A steam engine has a thermal efficiency of 10.0% and does 4500 J of useful work each cycle. What is the heat lost to the environment in each cycle?

9. If an engine does 1350 J of net work and exhausts 950 J of heat per cycle, what is its thermal efficiency?