

Additional problems on heat engines:

1. A heat engine operates between a heat reservoir at 80°C and one at 40°C . It delivers 200J of work per cycle. What are possible values for the heat absorbed from the hotter reservoir and the heat delivered to the colder reservoir? Give three possible answers.
2. An absolute temperature scale defines 1 degree to be the temperature of a human running a high fever. With this temperature scale, what is the temperature of a healthy human? At which temperature does water freeze?
- 3.
4. A reversible heat engine is used to define an absolute temperature scale where the difference in temperature between the boiling and freezing points of water is 50 degrees. What are the boiling and freezing temperatures of water in that scale?
5. A reversible Carnot engine has 95% efficiency. If the low temperature reservoir is a mixture of ice and water, what is the temperature of the high temperature reservoir in $^{\circ}\text{C}$?
6. A heat engine operating between 2 heat reservoirs delivers 100J of work and releases 20J of heat to the colder reservoir per cycle. If the colder reservoir is a mixture of ice and water, what is the temperature of the hotter reservoir if the engine is reversible? And if it is irreversible?
- 7.
8. A reversible heat engine operates between 3 temperature reservoirs at temperatures 200K , 300K and 400K . What is its efficiency?
- 9.
10. A refrigerator transfers 100J of heat per cycle from a room at 20°C to the outdoors at 30°C . How much work does it do per cycle?