Chapter One: Conceptual Questions
[from Cengal]

1. [CB 1-13C] Much of the energy generated in the engine of a car is removed by circulating water through the engine and to the radiator where it is transferred to the air. Shoud the radiator be analyzed as a closed system, or an open system? Explain.

2. [CB 1-14C] A can of coke is placed in the refrigerator to cool. Would you model the coke in the can as a closed or open system? Explain.

3. Would you consider the coffee in a coffee cup as a closed or open system? Explain. Are there different circumstances where you might be able to model it different ways?

4. [CB 1-20C] List the forms of energy that contribute to the internal energy of a system.

5. [CB 1-21C] How are heat, internal energy and thermal energy related to one another?

6. [CB 1-22C] What is the difference between intensive and extensive properties of a system?

7. Why can we consider quasi-static processes equivalent to processes in thermodynamic equilibrium?

8. [CB 1-41C] What is the zeroth law of thermodynamics?

9. [CB 1-28C] What is the difference between guage pressure and absolute pressure?

10. [CB 2-14C] A well sealed rigid tank contains some water and air at atmospheric pressure. The tank is now heated, and the water starts boiling. Will the temperature in the tank remain constant during this boiling process? Why?

11. [CB 2-10C] What is the difference between the critical point and the triple point?

12. [CB 2-11C] Is it possible to have water vapor at −10°C?

14. [CB 3-2C] When is the energy crossing the boundaries of a system heat, and when is it work?

15. [CB 3-3C] How are adiabatic processes defined?

16. [CB 3-4C] What is the sign convention that we use for work and heat?
17. [CB 3-5C] A piston is forced downward in a cylinder compressing and heating the gas trapped in the cylinder. Is this process considered a heat or a work interaction?

18. [CB 3-6C] An insulated room is heated by an electric space heater. If we consider the air in the room as our system, is this process considered a heat interaction or a work interaction? If we consider the entire room, including the space heater, as our system, is this process considered a heat interaction or a work interaction?

19. [CB 3-33C] An ideal gas initially in a given state can expand isothermally, or isobarically. In which case is the work done by the gas greater?

20. [CB 3-61C] A fixed mass of an ideal gas is heated from 50°C to 80°C at a constant pressure of (a) 1 atm and (b) 3 atm. For which case do you think the energy required will be greater? Why?

21. [CB 3-62C] A fixed mass of an ideal gas is heated from 50°C to 80°C at a constant volume of (a) 1 m³ and (b) 3 m³. For which case do you think the energy required will be greater? Why?

22. [CB 3-63C] A fixed mass of an ideal gas is heated from 50°C to 80°C (a) at constant pressure and (b) at constant volume. For which case do you think the energy required will be greater? Why?

23. [CB 3-59C] Is the energy required to heat a sample of air from 295K to 305K the same as that required to heat the same sample of air from 345K to 355K? Assume that the pressure remains constant in both cases.