

thermodynamics - practice problems

1. A hot ceramic mug and a cool wooden table are touching. Which direction does heat flow, and when does the flow mostly stop?

2. A metal chair and a wooden chair have been in the same room all night at 21°C . They are at the same temperature, but the metal feels colder. Why?

3. A drop of food coloring spreads through a cup of water. Does the system move toward higher entropy or lower entropy?

4. A video shows spilled milk jumping back into a glass. What thermodynamics idea makes that look wrong?

5. A gas loses 30 J as heat while 80 J of work is done on it by a piston. What is the change in the gas's internal energy?

6. A gas loses 120 J as heat and does 40 J of work on the surroundings. What is the change in internal energy of the gas?

7. A gas receives 80 J of heat and expands for 2.0 s. What is the change in internal energy?

8. A system starts with 500 J of internal energy. During a process, 120 J of heat exits and 80 J of work is done on the system. What is the final internal energy?

9. A small engine loses 0.50 kJ as heat during one cycle. In the same cycle, 200 J of work is done on the engine by a moving piston. What is the change in internal energy?

10. A 1000 kg car moving at 36 km/h skids to a stop on level ground. If the car's kinetic energy leaves the car as heat, how much heat exits the car's system?

11. A 0.40 kg ball starts with 20 J of kinetic energy and rolls through grass until it stops. If the ball ends at the same height, how much heat leaves the ball's system?