

Fundamentals of Thermodynamics

Physics · Answer Key · 15 Questions

1. What does the Zeroth Law of Thermodynamics establish?

- A) The conservation of energy
- B) The concept of temperature**
- C) The impossibility of absolute zero
- D) The increase of entropy

2. Which thermodynamic property represents the measure of disorder or randomness in a system?

- A) Enthalpy
- B) Internal energy
- C) Entropy**
- D) Gibbs free energy

3. What is the value of absolute zero in degrees Celsius?

- A) -273.15 °C**
- B) -100.00 °C
- C) 0.00 °C
- D) -373.15 °C

4. The First Law of Thermodynamics is a specific statement of which universal principle?

- A) Conservation of momentum
- B) Conservation of mass
- C) Conservation of charge
- D) Conservation of energy**

5. In a reversible adiabatic process, which thermodynamic property remains constant?

- A) Pressure
- B) Temperature
- C) Entropy**
- D) Volume

6. Which thermodynamic potential is minimized when a system is at constant temperature and pressure?

- A) Helmholtz free energy
- B) Gibbs free energy**
- C) Enthalpy
- D) Internal energy

7. What is the SI unit for measuring heat or thermal energy?

- A) Watt
- B) Joule**
- C) Pascal
- D) Kelvin

8. According to the Third Law of Thermodynamics, what happens to the entropy of a perfect crystal as temperature approaches absolute zero?

- A) It becomes infinite
- B) It reaches a minimum constant value
- C) It becomes zero**
- D) It increases linearly

9. Which gas law describes the relationship between pressure, volume, and temperature for an ideal gas?

- A) Boyle's Law
- B) Charles's Law
- C) Dalton's Law
- D) Ideal Gas Law**

10. What is the term for a process that occurs without the transfer of heat into or out of the system?

- A) Isothermal
- B) Isobaric
- C) Adiabatic**
- D) Isochoric

11. Which property of a substance is defined as the amount of heat required to raise the temperature of one gram by one degree Celsius?

- A) Latent heat
- B) Specific heat capacity**
- C) Thermal conductivity
- D) Enthalpy of fusion

12. Which phase change process involves a substance changing directly from a solid to a gas?

- A) Condensation
- B) Evaporation
- C) Sublimation**
- D) Deposition

13. The efficiency of a Carnot engine depends exclusively on which variables?

- A) The working substance
- B) The temperature of the two reservoirs**
- C) The engine size
- D) The pressure of the intake

14. What does an isobaric process imply in a thermodynamic system?

- A) Constant temperature
- B) Constant volume
- C) Constant pressure**
- D) Constant entropy

15. Which statement best describes the Kelvin-Planck formulation of the Second Law of Thermodynamics?

- A) Energy cannot be created or destroyed.
- B) Heat cannot be fully converted into work in a cycle.**
- C) Entropy of a system always decreases in a closed cycle.
- D) Temperature reaches equilibrium in an isolated system.