

Foundations of Thermodynamics

Thermodynamics · Answer Key · 10 Questions

1. Who published the 1824 treatise 'Reflections on the Motive Power of Fire', which introduced the theoretical framework for the Carnot cycle?

- A) Rudolf Clausius
- B) Sadi Carnot**
- C) Lord Kelvin
- D) James Prescott Joule

2. In 1874, who first proposed the concept of 'Loschmidt's Paradox', identifying the conflict between the time-reversible laws of mechanics and the time-irreversible second law of thermodynamics?

- A) Josef Loschmidt**
- B) Ludwig Boltzmann
- C) Max Planck
- D) Henri Poincaré

3. Which scientist is credited with the invention of the first gas thermometer, which utilized the expansion of air to measure temperature changes?

- A) Galileo Galilei**
- B) Guillaume Amontons
- C) Daniel Gabriel Fahrenheit
- D) Anders Celsius

4. The term 'Entropy' was first coined and introduced into the scientific lexicon in 1865 by which physicist?

- A) James Clerk Maxwell
- B) Ludwig Boltzmann
- C) Rudolf Clausius**
- D) William Rankine

5. In 1798, who performed the famous 'boring of cannon' experiment, which provided the first significant empirical evidence against the caloric theory of heat?

- A) Benjamin Thompson (Count Rumford)**
- B) Humphry Davy
- C) Antoine Lavoisier
- D) John Dalton

6. Which Dutch physicist was the first to liquefy helium in 1908, a feat achieved by reaching temperatures near absolute zero?

A) Heike Kamerlingh Onnes

B) Johannes Diderik van der Waals

C) Hendrik Lorentz

D) Peter Debye

7. The Joule-Thomson effect, which describes the temperature change of a real gas or liquid when it is forced through a valve or porous plug, was first observed in what year?

A) 1852

B) 1840

C) 1866

D) 1871

8. Which thermodynamic property was defined as 'Free Energy' by Josiah Willard Gibbs in his 1873 paper, 'A Method of Geometrical Representation of the Thermodynamic Properties of Substances by Means of Surfaces'?

A) Enthalpy

B) Gibbs Free Energy

C) Helmholtz Free Energy

D) Internal Energy

9. Who is credited with the first experimental determination of the mechanical equivalent of heat, proving that mechanical work could be converted into thermal energy?

A) James Prescott Joule

B) Robert Mayer

C) Lord Kelvin

D) Sadi Carnot

10. The 'Maxwell's Demon' thought experiment, which challenged the second law of thermodynamics, was first described by James Clerk Maxwell in a letter written in which year?

A) 1867

B) 1855

C) 1872

D) 1880