

Thermodynamics Fundamentals

Thermodynamics · Practice Test · 12 Questions

1. Which of the following processes involves the transfer of heat energy through electromagnetic waves, requiring no medium for propagation?

- A) Conduction in a metal rod
- B) Convection in boiling water
- C) Radiation from the Sun
- D) Advection of warm air

2. According to the first law of thermodynamics, energy cannot be created or destroyed, only transformed. If 100 Joules of heat are added to a system, and the system does 40 Joules of work, what is the change in the internal energy of the system?

- A) 60 Joules
- B) 140 Joules
- C) 100 Joules
- D) 40 Joules

3. When a substance undergoes a phase change from a liquid to a gas at a constant temperature, the energy absorbed by the substance is known as:

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

4. A measure of the average kinetic energy of the particles within a substance is called:

- A) Heat
- B) Entropy
- C) Temperature
- D) Internal energy

5. Which state of matter has the most ordered arrangement of its particles and the lowest kinetic energy among its constituent particles at a given pressure?

- A) Gas
- B) Plasma
- C) Liquid
- D) Solid

6. The second law of thermodynamics states that in any spontaneous process, the total entropy of an isolated system tends to increase. Which real-world observation best illustrates this principle?

- A) Ice melting in a warm room
- B) A refrigerator cooling its contents
- C) Water freezing at 0°C
- D) A pendulum swinging indefinitely

7. What is the primary mechanism of heat transfer when you hold a hot metal spoon, and your hand starts to feel warm?

- A) Convection
- B) Radiation
- C) Conduction
- D) Evaporation

8. If you have a sealed container of gas that is heated, what is the most likely immediate effect on the gas particles?

- A) They will move slower and closer together.
- B) They will gain kinetic energy and move faster.
- C) They will lose mass and shrink.
- D) They will become more ordered and form a lattice.

9. Which of the following statements about specific heat capacity is correct?

- A) It is the amount of heat required to raise the temperature of 1 gram of a substance by 1 degree Celsius.
- B) It is the total energy stored within a substance.
- C) It is the rate at which heat flows through a material.
- D) It is the maximum amount of work a system can perform.

10. A black object absorbs more radiant energy than a white object when exposed to the same light source. This relates to the property of:

- A) Thermal conductivity
- B) Specific heat capacity
- C) Emissivity
- D) Absorptivity

11. When water boils, it changes from a liquid to a gas. During this phase transition at its boiling point, the temperature of the water remains constant because the added energy is used to:

- A) Increase the kinetic energy of the water molecules
- B) Break the intermolecular bonds between water molecules
- C) Decrease the density of the water
- D) Convert the water into ice

12. In an ideal refrigerator, which of the following statements is true according to the laws of thermodynamics?

- A) It creates energy to cool the interior.
- B) It can achieve 100% efficiency in transferring heat.
- C) It moves heat from a colder region to a hotter region by expending work.
- D) Its operation leads to a net decrease in the entropy of the universe.