CLASS 11 PHYSICS EXTRA QUESTIONS

# Class 11 Physics Chapter 11 Thermodynamics – Extra Questions with Answers

Extra practice questions for Class 11 Physics Chapter 11 (Thermodynamics), beyond the textbook. These Class 11 Physics Chapter 11 important questions are handy for last-minute exam practice.

## Contents

Extra practice questions for Class 11 Physics Chapter 11 (Thermodynamics), beyond the textbook. These Class 11 Physics Chapter 11 important questions are handy for last-minute exam practice.

## Very Short Answer Questions (1 mark)

**Q1. State the zeroth law of thermodynamics.**
Ans: If two systems are separately in thermal equilibrium with a third system, they are in thermal equilibrium with each other.

**Q2. What is ΔU in an isothermal process?**
Ans: Zero, since temperature (and hence internal energy of an ideal gas) does not change.

**Q3. What is ΔQ in an adiabatic process?**
Ans: Zero, no heat exchange occurs.

**Q4. Write the formula for efficiency of a heat engine.**
Ans: $\eta = W/Q_1 = 1 - Q_2/Q_1$.

**Q5. Can the efficiency of any real heat engine be 100%?**
Ans: No, by the second law of thermodynamics, no engine can be 100% efficient.

## Short Answer Questions (2–3 marks)

**Q6. A gas absorbs 500 J of heat and does 200 J of work on its surroundings. Find the change in internal energy.**
Ans: $\Delta U = \Delta Q - \Delta W = 500 - 200 = 300$ J.

**Q7. A Carnot engine operates between 600 K and 300 K. Find its efficiency.**
Ans: $\eta = 1 - T2/T1 = 1 - 300/600 = 0.5 = 50\%$.

**Q8. A heat engine absorbs 800 J from a hot reservoir and rejects 500 J to a cold reservoir. Find its efficiency.**
Ans: $\eta = 1 - Q2/Q1 = 1 - 500/800 = 0.375 = 37.5\%$.

## Higher-Order Thinking / Application Questions

**Q9. A Carnot engine operating between 500 K and 300 K absorbs 1000 J of heat from the source. Calculate the work done by the engine and the heat rejected to the sink, showing the steps.**
Ans: Efficiency $\eta = 1 - T2/T1 = 1 - 300/500 = 0.4$. Work done $W = \eta Q1 = 0.4(1000) = 400$ J. Heat rejected $Q2 = Q1 - W = 1000 - 400 = 600$ J (this can also be verified using $Q2/Q1 = T2/T1 = 300/500 = 0.6$, so $Q2 = 0.6 \times 1000 = 600$ J, consistent).

**Q10. Explain, using the second law of thermodynamics, why a refrigerator (which moves heat from a colder region to a hotter region) requires external work input to operate, even though the first law alone does not forbid spontaneous heat flow from cold to hot.**
Ans: The first law of thermodynamics is simply a statement of energy conservation and does not by itself specify the direction in which heat can flow — it would technically allow heat to spontaneously flow from a cold body to a hot body as long as total energy is conserved. However, the second law of thermodynamics (Clausius statement) explicitly forbids heat from flowing spontaneously from a colder to a hotter body without external work being done on the system. This is why a refrigerator, which removes heat from its cold interior and dumps it into the warmer room, must consume electrical energy (external work) to force this non-

spontaneous heat flow to happen — without this work input, the process would violate the second law.

## Class 11 Physics Chapter 11 – Solutions and Notes

For complete step-by-step answers and a quick summary, check the Class 11 Physics Chapter 11 Solutions and Class 11 Physics Chapter 11 Revision Notes.

**See also:** Chapter 1 | Chapter 2 | Chapter 3 | Chapter 4 | Chapter 5 | Chapter 6 | Chapter 7 | Chapter 8 | Chapter 9 | Chapter 10 | Chapter 11

**Practice more:** Chapter 1 | Chapter 2 | Chapter 3 | Chapter 4 | Chapter 5 | Chapter 6 | Chapter 7 | Chapter 8 | Chapter 9 | Chapter 10

**Quick revision:** Chapter 1 | Chapter 2 | Chapter 3 | Chapter 4 | Chapter 5 | Chapter 6 | Chapter 7 | Chapter 8 | Chapter 9 | Chapter 10