

## Worksheet: Thermodynamics

IB · Class 11 · Physics · 10 questions · 31 marks

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 31

**Q1.** A gas absorbs 500 J of heat and does 200 J of work. Find the change in internal energy. *[2 marks]*

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**Q2.** Why can a heat engine never have 100% efficiency? *[2 marks]*

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**Q3.** According to the law of equipartition of energy, what is the molar specific heat of a solid at ordinary temperature, and what is its approximate numeric value? *[2 marks]*

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**Q4.** 2 moles of an ideal gas expand isothermally at 300 K from 5 L to 15 L. Find the work done ( $R = 8.314$  J/mol/K). *[3 marks]*

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**Q5.** A monatomic ideal gas is compressed adiabatically to  $1/8$  of its original volume. By what factor does its pressure increase? *[3 marks]*

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**Q6.** For a diatomic gas at ordinary temperature,  $C_v = 5R/2$ . Find  $C_p$  and  $\gamma$ . [3 marks]

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**Q7.** A Carnot engine operates between a source at 600 K and a sink at 300 K, absorbing 1000 J from the source per cycle. Find the efficiency and the heat rejected to the sink. [3 marks]

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**Q8.** In a cyclic process, a system absorbs 1000 J of heat and rejects 600 J. Find the net work done and the efficiency. [3 marks]

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**Q9.** A Carnot engine absorbs 800 J from a reservoir at 400 K and rejects heat to a sink at 250 K. Find (a) the efficiency, (b) the work done per cycle, (c) the heat rejected per cycle. [5 marks]

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**Q10.** 1 mole of a monatomic ideal gas at 300 K expands adiabatically until its volume doubles. Find the final temperature and the work done by the gas ( $R = 8.314 \text{ J/mol/K}$ ). [5 marks]

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