Physics Formula Sheet

Chapter by chapter, topic by topic. Written by the PadhoNa team for quick revision.

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CHAPTER 13

Thermal Properties of Matter

Thermal expansion

$$\Delta L = L\alpha\,\Delta T, \qquad \Delta A = A\beta\,\Delta T, \qquad \Delta V = V\gamma\,\Delta T$$

$$\alpha : \beta : \gamma = 1 : 2 : 3$$

PENDULUM CLOCK

$$\Delta t = \tfrac{1}{2}\alpha\,\Delta T \times t \ \text{(time lost per } t \text{ when hotter)}$$

TEMPERATURE SCALES

$$\frac{C}{100} = \frac{F-32}{180} = \frac{K-273.15}{100}$$

Calorimetry and specific heat

$$Q = mc\,\Delta T, \qquad Q = mL, \qquad \text{heat lost} = \text{heat gained}$$

Heat transfer

CONDUCTION

$$\frac{dQ}{dt} = \frac{KA\,\Delta T}{L}, \qquad R_{\text{th}} = \frac{L}{KA}$$

SERIES AND PARALLEL

$$R = R_1 + R_2 \ \text{(series)}, \qquad \frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} \ \text{(parallel)}$$

STEFAN–BOLTZMANN

$$P = e\sigma A T^4; \qquad P_{\text{net}} = e\sigma A(T^4 - T_0^4)$$

WIEN'S LAW

$$\lambda_m T = b \approx 2.9 \times 10^{-3}\ \mathrm{m\,K}$$

NEWTON'S LAW OF COOLING

$$\frac{dT}{dt} = -k(T - T_0); \qquad \frac{T_1 - T_2}{t} \approx k\left(\frac{T_1 + T_2}{2} - T_0\right)$$

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