EngineeringRise

Heat, calorimetry and heat transfer

Formulas and units, JEE Main. Status: Reviewed on 2026-11-20.

Result	Formula	Units or note
Heat	Q = m s dT; heat capacity = m s Valid when: no phase change in the range; s taken constant	J (1 cal = 4.2 J)
Latent heat	Q = m L Valid when: during a change of state at constant temperature	J
Calorimetry	heat lost = heat gained; water equivalent W = m s Valid when: no heat lost to the surroundings; no work done	g or kg
Linear expansion	dL = L alpha dT Valid when: small temperature change; solid with constant alpha	m
Area and volume expansion	dA/A = 2 alpha dT; dV/V = 3 alpha dT Valid when: isotropic solid, small temperature change	no unit
Thermal stress	stress = Y alpha dT Valid when: rod rigidly clamped, small dT, within elastic limit	N/m^2
Conduction	H = k A dT/L; R = L/(k A) Valid when: steady state, one-dimensional flow, sides insulated	W (K/W)
Series resistances	R = R1 + R2; junction by dT in the ratio of R Valid when: steady state, same heat current through both layers	K/W
Stefan's law	P = e sigma A T^4 (T in kelvin) Valid when: temperature T in kelvin; e is emissivity of the surface	W
Net radiation	P = e sigma A (T^4 - T0^4) Valid when: body at T in surroundings at T0, both in kelvin	W

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/physics/properties-of-solids-and-liquids/heat-calorimetry-and-heat-transfer

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