Electricity and optics experiments: metre bridge, Ohm law, galvanometer, mirrors, lenses, prism, diodes

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

Result	Formula	Units or note
Metre bridge	X = R l/(100 - l) Valid when: balanced bridge at null point; l in cm measured from the end where X sits, R in the other gap	ohm (l in cm)
Resistivity from a wire	rho = X pi d^2/(4 L) Valid when: uniform wire of circular cross-section; d diameter, L length	ohm m
Ohm law (graph)	R = slope of V against I Valid when: ohmic conductor at steady temperature, line through the origin	ohm
Voltmeter loading correction	R = V/(I - V/R_v) Valid when: voltmeter across the resistor only, ammeter reading the total current; R_v the voltmeter resistance	ohm
Galvanometer resistance (half deflection)	G = R S/(R - S) Valid when: half-deflection method, cell internal resistance negligible, R much larger than G	ohm
Figure of merit	k = E/((R + G) theta) Valid when: galvanometer in series with R, deflection theta in divisions, cell resistance negligible	A per division
Lens or mirror by parallax	1/f = 1/u + 1/v; f = u v/(u + v) in magnitudes Valid when: thin lens or mirror, small aperture, real distances taken as magnitudes	cm
Error in f	df/f^2 = du/u^2 + dv/v^2 Valid when: small errors in u and v, maximum error estimate	cm
Prism refractive index	mu = sin((A + delta_min)/2)/sin(A/2) Valid when: prism of angle A at minimum deviation, delta_min and A in the same angle unit	dimensionless
Diode dynamic resistance	r = dV/dI (slope) Valid when: any diode on a smooth region of its I-V curve, small changes about the operating point	ohm
Zener breakdown voltage (reading) and regulator currents (extension)	V_z: intercept of the steep reverse curve on the voltage axis; extension: I_z = (V_in - V_z)/R_s - V_z/R_L Valid when: V_z: steep reverse breakdown region; I_z: Zener with series resistor R_s and load R_L, regulating	A

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/physics/experimental-skills/electricity-and-optics-experiments-metre-bridge-ohm

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