EngineeringRise

Measuring instruments: vernier calipers, screw gauge, metre scale and pendulum

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

Result	Formula	Units or note
Vernier least count	LC = 1 MSD - 1 VSD = 1 MSD/N Valid when: vernier with N divisions equal to N-1 main scale divisions	mm
Vernier reading	MSR + n x LC - zero error Valid when: MSR is main scale reading, n the coinciding division; zero error signed (+ if zero past line)	mm
Screw gauge least count	LC = pitch/number of circular divisions Valid when: screw gauge; pitch is the advance per full turn	mm
Screw gauge zero error	+k x LC (zero past line); -(N - n0) x LC (closed reading n0 above N/2) Valid when: screw gauge with studs touching; k divisions past the line is positive, closed reading above N/2 is negative	mm
Percentage error of a power law	x^a y^b: a (dx/x) + b (dy/y) Valid when: small independent errors, maximum error estimate for a product or quotient of powers	percent
Pendulum g and error	g = 4 pi^2 l/T^2; dg/g = dl/l + 2 dT/T Valid when: small-angle simple pendulum (under about 5 degrees), l to the bob centre	m/s^2
Pendulum energy decay	A = A0 exp(-k t); E proportional to A^2, half-life of E = half-life of A divided by 2 Valid when: light damping with amplitude decaying exponentially; E proportional to A^2	s
Metre scale balance	sum of clockwise moments = sum of anticlockwise moments Valid when: rigid uniform metre scale at rest, moments taken about the knife edge	g cm

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/physics/experimental-skills/measuring-instruments-vernier-calipers-screw-gauge

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