EngineeringRise

Definite integrals and properties

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

Result	Formula	Units or note
Fundamental theorem	integral from a to b of f(x) dx = F(b) - F(a) Valid when: f continuous on [a, b], F any antiderivative of f	number (area units for a plane region)
Odd and even	from -a to a: 2 x integral 0 to a if f even; 0 if f odd Valid when: f integrable on [-a, a]; even or odd about 0	number
King property	integral a to b of f(x) dx = integral a to b of f(a + b - x) dx Valid when: f integrable on [a, b]	number
Complementary form	integral a to b of f(x)/(f(x) + f(a + b - x)) dx = (b - a)/2 Valid when: f(x) + f(a + b - x) is not zero anywhere on [a, b]	number
Pi trick	integral 0 to pi of x g(sin x) dx = (pi/2) integral 0 to pi of g(sin x) dx Valid when: x g(sin x) integrable on [0, pi]; g any function of sin x	number
Periodic function	integral 0 to nT of f = n x integral 0 to T of f Valid when: f periodic with period T, n a positive integer	number
Half-range doubling	integral 0 to 2a of f = 2 x integral 0 to a of f if f(2a - x) = f(x); 0 if f(2a - x) = -f(x) Valid when: symmetry f(2a - x) = f(x) or -f(x) holds on [0, 2a]	number
Trigonometric powers	odd power: t = sin x or cos x; even power: sin^2 x = (1 - cos 2x)/2, cos^2 x = (1 + cos 2x)/2 Valid when: integer powers of sin x or cos x	number
Bounds	if m <= f(x) <= M on [a, b] then m(b - a) <= integral from a to b of f(x) dx <= M(b - a) Valid when: a < b; m and M are bounds of f on [a, b]	number

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/mathematics/integral-calculus/definite-integrals-and-properties

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