

PHYSICS (SI) + AVIATION QUICK CHEAT SHEET

BASE (SI) QUANTITIES

Length l — m | Time t — s | Mass m — kg

Temperature T — K | Current I — A | Amount n — mol

Luminosity L — lm

AVIATION CONVERSIONS

1 ft = 0.3048 m • 1 NM = 1852 m • 1 mile = 1609 m

1 m/s = 3.6 km/h • 1 m/s ≈ 200 ft/min

1 kt = 1.852 km/h • 1 kt = 0.5144 m/s • 1 mph = 1.609 km/h

KINEMATICS (MOTION)

Speed/Velocity: $v = \Delta s / \Delta t$ (v: m/s, s: m, t: s)

Acceleration: $a = \Delta v / \Delta t$ (a: m/s²)

Centripetal accel.: $a_{cp} = v^2 / R$ (R: m)

Radians: π rad = 180° • 1 rad ≈ 57.3°

Angular speed: $\omega = \Delta\phi / \Delta t = 2\pi / T$ (ω : rad/s, T: s)

DYNAMICS

Force (Newton 2): $F = m \cdot a$ (F: N)

Weight: $F_g = m \cdot g$ ($g \approx 9.81$ m/s²)

Momentum: $I = m \cdot v$ (I: kg·m/s)

Force-momentum: $F = \Delta I / \Delta t$

Work: $W = F \cdot s$ (W: J)

Torque/Moment: $M = F \cdot k$ (M: N·m, k: m)

ENERGY & POWER

Kinetic (translation): $E_k = \frac{1}{2} m v^2$ (J)

Kinetic (rotation): $E_{rot} = \frac{1}{2} \theta \omega^2$ (θ : kg·m²)

Potential: $E_p = m g h$ (h: m)

Total: $E_t = E_i + E_k + E_p$

Power: $P = W / \Delta t = F \cdot v$ (P: W)

Aviation: $P_{req} = D \cdot v_{TAS}$ (D: N, v: m/s)

FLUIDS / GASES

Density: $\rho = m / V$ (ρ : kg/m³)

Static pressure: $p = F / A$ (p: Pa, A: m²)

Rearranged: $F = p \cdot A$

General gas equation: $p / \rho = R \cdot T$ (air: $R = 287.2$ J/(kg·K))

Gas process: $(pV) / T = \text{const} \rightarrow (p_1 V_1) / T_1 = (p_2 V_2) / T_2$

Isochoric: $p_1 / T_1 = p_2 / T_2$ • Isothermal: $p_1 V_1 = p_2 V_2$ •

Isobaric: $V_1 / T_1 = V_2 / T_2$

Hydrostatic: $p_h = \rho g h$ and $\Delta p = \rho g h$

Dynamic pressure: $p_d = \frac{1}{2} \rho v^2$ (Pa)

UNIT IDENTITIES

$1 \text{ N} = 1 \text{ kg} \cdot \text{m/s}^2$ • $1 \text{ J} = 1 \text{ N} \cdot \text{m}$ • $1 \text{ W} = 1 \text{ J/s}$ • $1 \text{ Pa} = 1 \text{ N/m}^2$

TEMPERATURE

$T_{\circ C} = T_K - 273$ (approx) • $T_{\circ C} = (T_{\circ F} - 32) \cdot 5/9$

Note: The symbol W is often used for work (J). For weight, this sheet uses F_g .