

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 \approx 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 \approx 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: $l = m \cdot v$ (l : kg·m/s)

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

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: $p/p = R \cdot T$ (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 N = 1 kg·m/s² • 1 J = 1 N·m • 1 W = 1 J/s • 1 Pa = 1 N/m²

TEMPERATURE

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

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