Gliding Flight: Glide Ratio, Sink Rate and Glide Range

Glide angle, sink rate and glide distance from a height for an aircraft or glider without thrust, with the best-glide and minimum-sink speeds from the drag polar.

Method: Gliding flight with a parabolic drag polar

Input parameters

Unit system: SI

Parameter	Value	Unit
Weight	4,500.0	N
Wing area	11.000	m²
Zero-lift drag coefficient	0.012000	
Aspect ratio	22.000	
Oswald efficiency factor	0.90000	
Glide true airspeed	108.00	km/h
Height available	1,500.0	m
Altitude (ISA, geopotential)	1,000.0	m

Calculated results

Parameter	Value	Unit
Glide ratio at this speed	35.944	
Sink rate	0.83430	m/s
Glide distance from the height	53.917	km
Best glide ratio	35.999	
Best-glide speed	105.07	km/h
Minimum-sink speed	79.839	km/h
Minimum sink rate	0.71137	m/s

Notes for this case

- Steady glide with a parabolic polar: tan γ = 1/(L/D). The best glide is at C_L = √(C_D0/k); the minimum sink at C_L = √(3C_D0/k), 0.76 of the best-glide speed. Still air; wind changes the ground distance.

Formula and method

$$\tan\gamma = \frac{1}{L/D}, \quad V_v = V\sin\gamma, \quad R_g = \Delta h\,\frac{L}{D}$$

$$V_{bg} = \sqrt{\frac{2W}{\rho S}}\left(\frac{k}{C_{D0}}\right)^{1/4}, \quad V_{ms} = \frac{V_{bg}}{3^{1/4}}$$

Variables

W	Weight	N
S	Wing area	m²
C_{D0}	Zero-lift drag coefficient	-
AR	Aspect ratio	-
e	Oswald efficiency factor	-
V	Glide true airspeed	m/s

Δh	Height available	m
h	Altitude (ISA, geopotential)	m
L/D	Glide ratio at this speed	-
V_v	Sink rate	m/s
R_g	Glide distance from the height	m
$(L/D)_{max}$	Best glide ratio	-
V_{bg}	Best-glide speed	m/s
V_{ms}	Minimum-sink speed	m/s
$V_{v,min}$	Minimum sink rate	m/s

Method and standards

Equilibrium glide.

Assumptions and limits

- Steady glide in still air, parabolic polar, ISA.

References

Gliding flight with a parabolic drag polar

Report details

Report reference	FCC-SJX8-JM3N (the same inputs always give the same reference)
Generated	23 November 2026, 17:50 UTC
Calculator	Gliding Flight: Glide Ratio, Sink Rate and Glide Range
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/mechanical/aerospace/glide-ratio-sink-rate

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Reopens the calculator with the inputs of this report.