Simple and Compound Pendulum Period

Period of a simple pendulum from length, and of a compound pendulum from its moment of inertia about the pivot and the distance to its centre of gravity.

Method: Rao; Mechanical Vibrations; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Simple pendulum length	1.0000	m
Moment of inertia about the pivot (compound)	2.0000	kg·m²
Mass (compound)	10.000	kg
Pivot to centre of gravity (compound)	0.40000	m
Measured compound period (optional, for the inertia check) Leave at 0 to check against the computed period.	0	s
Local gravity	9.8066	m/s²

Calculated results

Parameter	Value	Unit
Simple pendulum period	2.0064	s
Compound pendulum period	1.4187	s
Equivalent simple length I_O/(mh)	0.50000	m
Inertia from the measured period (or from T_c when none is entered)	2.0000	kg·m²

Notes for this case

- Small swings (below about 10°). Swinging a part as a compound pendulum is a practical way to measure its moment of inertia.

Formula and method

$$T_s = 2\pi\sqrt{\frac{L}{g}}, \quad T_c = 2\pi\sqrt{\frac{I_O}{mgh}}, \quad L_e = \frac{I_O}{mh}, \quad I_{O,m} = \frac{T_m^2\, mgh}{4\pi^2}$$

Variables

L	Simple pendulum length	m
I_O	Moment of inertia about the pivot (compound)	kg·m²
m	Mass (compound)	kg
h	Pivot to centre of gravity (compound)	m
g	Local gravity	m/s
T_s	Simple pendulum period	s
T_c	Compound pendulum period	s
L_e	Equivalent simple length I_O/(mh)	m
T_m	Measured compound period (optional; 0 uses T_c)	s
$I_{O,m}$	Inertia from the measured period (or from T_c when none is entered)	kg·m²

Method and standards

Small-angle pendulum.

Assumptions and limits

- Small oscillations.

References

- Rao
- Mechanical Vibrations
- 6th ed. (Pearson, 2017)
- ch. 2
- Meriam and Kraige
- Engineering Mechanics: Dynamics
- 8th ed. (Wiley, 2015)
- ch. 6

Report details

Report reference	FCC-Y7BP-2YFG (the same inputs always give the same reference)
Generated	17 November 2026, 19:44 UTC
Calculator	Simple and Compound Pendulum Period
Method last reviewed	13 November 2026
Software release	FireCAD Calc, release of 17 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/statics-dynamics/pendulum-period

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.