Lever: Effort, Mechanical Advantage and Fulcrum Reaction

Effort needed on a lever of the first, second or third class from the load and the arm lengths, the mechanical advantage and the force on the fulcrum.

Method: Textbook mechanics (principle of moments)

Input parameters

Unit system: SI

Parameter	Value	Unit
Load	1.0000	kN
Load arm (fulcrum to load)	0.20000	m
Effort arm (fulcrum to effort)	1.0000	m
Lever class	First class (fulcrum between)	

Calculated results

Parameter	Value	Unit
Effort W a/b	0.20000	kN
Mechanical advantage b/a	5.0000	
Force on the fulcrum	1.2000	kN

Formula and method

$$P = W\frac{a}{b}, \quad MA = \frac{b}{a}$$

Variables

W	Load	N
a	Load arm (fulcrum to load)	m
b	Effort arm (fulcrum to effort)	m
class	Lever class	-
P	Effort W a/b	N
MA	Mechanical advantage b/a	-
R	Force on the fulcrum	N

Method and standards

Moments about the fulcrum.

Assumptions and limits

- Weightless, rigid lever.

References

- Textbook mechanics (principle of moments)

Report details

Report reference	FCC-ZTC5-KT9C (the same inputs always give the same reference)
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Calculator	Lever: Effort, Mechanical Advantage and Fulcrum Reaction
Method last reviewed	12 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/lever-mechanical-advantage

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.