Arithmetic, Geometric, Harmonic and RMS Means

Arithmetic, geometric, harmonic and root-mean-square means of up to ten positive values, and when each is the right average to use.

Method: Classical means and their inequalities

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of values used (2–10)	5.0000	
Value 1	1.0500	
Value 2	1.1200	
Value 3	0.96000	
Value 4	1.0800	
Value 5	1.1000	
Value 6	1.0000	
Value 7	1.0000	
Value 8	1.0000	
Value 9	1.0000	
Value 10	1.0000	

Calculated results

Parameter	Value	Unit
Arithmetic mean	1.0620	
Geometric mean	1.0605	
Harmonic mean	1.0589	
Root-mean-square (quadratic) mean	1.0635	

Notes for this case

- For positive values H ≤ G ≤ A ≤ RMS, with equality only when all values are equal. Use the geometric mean for growth factors and ratios (it gives the constant rate with the same overall product), the harmonic mean for rates over equal amounts (average speed over equal distances, average cost per unit with equal spend) and the RMS for quantities whose square matters (alternating current, vibration, noise).

Formula and method

$$\bar{x}_G = \left(\prod x_i\right)^{1/n}, \quad \bar{x}_H = \frac{n}{\sum 1/x_i}, \quad x_{rms} = \sqrt{\frac{\sum x_i^2}{n}}$$

Variables

n	Number of values used (2–10)	-
x_1	Value 1	-
x_2	Value 2	-
x_3	Value 3	-
x_4	Value 4	-
x_5	Value 5	-
x_6	Value 6	-
x_7	Value 7	-

x_8	Value 8	-
x_9	Value 9	-
x_{10}	Value 10	-
$\bar{x}_A$	Arithmetic mean	-
$\bar{x}_G$	Geometric mean	-
$\bar{x}_H$	Harmonic mean	-
x_{rms}	Root-mean-square (quadratic) mean	-

Method and standards

Means.

Assumptions and limits

- Positive values only.

References

Classical means and their inequalities

Report details

Report reference	FCC-XCEJ-YQR5 (the same inputs always give the same reference)
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Calculator	Arithmetic, Geometric, Harmonic and RMS Means
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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/general/geometry/geometric-harmonic-mean

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.