

Equation Library for the HP Prime

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The program eqnlib offers 47 equations for HP Prime's Solver App. Just run the eqlib program, select the category that you are interested in, and select the equation within that category and you are off and running!

The equation selected will be loaded into the system variable E1. The program will show you what each variable represents in the solver. Keep this screen up as long as you like. When done, press [Enter], and you will be taken to the Numeric View of the Solve App. To see the equation, press the soft (Defn) key.

Conventions used in the program eqnlib:

- * The default real variables are used, A-Z and θ . These variables are global and values can be transferred between calculations.
- * SI units are assumed (meters, kilograms, and seconds). Unit of Temperature varies between degrees Celsius ($^{\circ}\text{C}$).
- * Numerical and physical constants are entered and simplified whenever possible.

Terminal12:31

B = Relative Loudness (dB)
I = Sound Intensity
O = Hearing Threshold

Solve Numeric View12:32

B:6.99697499232

I:1

O:0.199665256665

Enter value or press solve

EditInfoDefnSolve

$$B=10*\text{LOG}\left(\frac{I}{O}\right)$$

OK

List of equations available and the variables that are represented in eqnlib:

Section 1: Geometry

1.1 Area: Circle	A = Area R = Radius
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1.2 Area: Ellipse	A = Area R = Semi Axis Length 1 S = Semi Axis Length 2
1.3 Area: Trapezoid	A = Area H = Height R = Top Side Length S = Bottom Side Length
1.4 Volume: Sphere	V = Volume R = Radius
1.5 Volume: Cylinder	V = Volume R = Radius H = Height
1.6 Volume: Cone	V = Volume R = Radius H = Height
1.7 Surface Area: Sphere	S = Surface Area R = Radius
1.8 Surface Area: Cylinder	S = Surface Area R = Radius H = Height
1.9 Distance Between 2 Points	Point 1: (X, Y) Point 2: (A, B)
1.10 Regular Polygon: Σ Angles	T = Total of Interior Angles N = Number of Sides
1.11 Area: Regular Polygon	A = Area N = Number of Sides S = Length of a Side

Section 2: Finance

2.1 Sales Tax	P = Total Price G = Gross Price S = Sale Tax Rate
2.2 Simple Interest	F = Future Value P = Present Value I = Interest Rate N = Number of Periods
2.3 Monthly Loan	L = Loan Amount I = Annual Interest Rate P = Monthly Payment N = Number of Years
2.4 Gross Up Payment	G = Gross Amount N = Net Amount R = Tax Rate
2.5 Breakeven-Profit	I = Net Income Q = Quantity P = Sale Price V = Variable Cost F = Fixed Cost

Section 3: Temperature Conversion

3 Temperature Conversion	F = Temp. °F C = Temp. °C
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Section 4: Physics – Motion

4.1 Linear Distance	D = Distance V = Velocity A = Acceleration T = Time
4.2 Circular w/Velocity	T = Period R = Radius V = Velocity
4.3 Circular w/Angular Velocity	T = Period W = Angular Velocity
4.4 Simple Pendulum	T = Period (s) L = Length (m) g = 9.80665 m/s ²
4.5 Terminal Velocity: Ball (Spherical)	M = Mass (kg) P = Density (kg/m ³) R = Radius of ball (cm) Cd = 0.47, g = 9.80665 m/s ²
4.6 Escape Velocity	M = Mass of Planet (kg) R = Radius of Planet (kg) G = 6.67384E-11 m ³ /(s ² *kg)

Section 5: Sound

5.1 Doppler Effect	F = Observed Frequency (Hz) O = Emitted Frequency (Hz) R = Velocity: Receiver (m/s) S = Velocity: Source (m/s) c = 299792458 m/s
5.2 Loudness	B = Relative Loudness (dB) I = Sound Intensity O = Hearing Threshold
5.3 Speed of Sound (Dry Air)	V = Speed of Sound (m/s) T = Temperature (°C)

Section 6: Optics

6.1 Snell's Law	N, M: Indices of Refraction θ = Angle of Incidence A = Angle of Refraction
6.2 Spherical Refraction	N,M: Indices of Refraction U = Distance to Object V = Distance to Image R = Curvature of Radius
6.3 Lens Equation	F = Focal Distance O = Object Distance I = Image Distance

Section 7: Electronics

7.1 Ohm's Law	I = Current (amps) V = Voltage (C) R = Resistance (Ω)
7.2 2 Resistors: Series	R = Total Resistance (Ω) A, B: Resistance of A, B
7.3 2 Resistors: Parallel	R = Total Resistance (Ω) A, B: Resistance of A, B
7.4 Thermal Noise: Voltage	V = Voltage (V) T = Temperature (K) R = Resistance (Ω) B = Bandwidth (Hz) $k = 1.3806488e-23$

Section 8: Astronomy

8.1 Parallax	D = Distance (AU) P = Parallax Angle
8.2 Star Luminosity	F = Flux Density: Surface L = Star's Luminosity D = Distance
8.3 Kepler's 3rd Law	P = Orbit (s) R = Radius (m) M, N = Planet Mass (kg) $G = 6.67384e-11 \text{ m}^3/(\text{s}^2 \cdot \text{kg})$
8.4 Time Dilation	O = Observer Time T = Traveler Time V = Velocity (m/s) $c = 299792458 \text{ m/s}^2$

Section 9: Great Circle Calculations

9 Great Circle	S = Great Circle Dist. (km) Latitude 1: A Longitude 1: B Latitude 2: C Longitude 2: D
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Section 10: Angle of Incidence

10 Angle of Incidence	θ = Angle of Incidence A = Elevation: Sun B = Azimuth (S>E): Sun C = Elevation: Panel D = Azimuth (S>E): Panel
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Section 11: Gases

11.1 Ideal Gas Law	P = Pressure (Pa) V = Volume (m^3) N = Number of Moles T = Temperature (K) R = 8.3144621 J/(mol*K)
11.2 Boyle's Law	P,Q: Pressure 1,2 V,W: Velocity 1,2
11.3 Heat Capacity	Q = Heat Change (J/mol) C = Heat Capacity (J/(mol*K)) T = Temperature (K)
11.4 Air Density	D = Air Density (kg/m^3) T = Temperature (K) R_spec = 287.085 J/(kg*K) Abs. Pressure = 101325 Pa
11.5 Isothermal Expansion	W = Work N = Number of Moles T = Temperature (K) V = Final Volume I = Initial Volume R = 8.3144621 J/(mol*K)

Section 12: Fluids

12.1 Pressure at Depth	P = Pressure (Pa) R = Reference Pressure (Pa) H = Depth (m) D = Density (kg/m^3) $g = 9.80665 \text{ m/s}^2$
12.2 Bernoulli's Equation	P,Q: Pressure 1,2 (Pa) V,W: Velocity 1,2 (m/s^2) H,I: Height 1,2 (m) R = Water Pressure (kg/m^3) $g = 9.80665 \text{ m/s}^2$
12.3 Fluid Flow	A,B: Area 1,2 V,W: Velocity 1,2

Resources:

HP 50g Equation Library. Hewlett Packard. 2006

Ball, John A. "Algorithms for RPN Calculators" John Wiley & Sons: 1978.

Jackson, Mark D. Ph.D "The QuickStudy for Physics" Bar Charts, Inc. Boca Raton, FL 2007

Thomas J. Glover. "Pocket Ref: 4th Ed" – 2012. Sequoia Publishing, Inc.: Littleton, CO