Important Gravitation Formulas PDF



Formulas Examples with Units

List of 20

Important Gravitation Formulas

Evaluate Formula

Evaluate Formula 🦳

1) Fundamental Concepts in Gravitation Formulas 🕝

1.1) Gravitational Field Intensity Formula 🕝

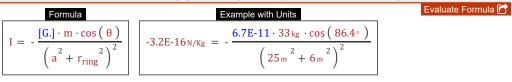
FormulaExample with Units $E = \frac{F}{m}$ $0.0758 \, \text{N/Kg} = \frac{2.5 \, \text{N}}{33 \, \text{kg}}$

1.2) Gravitational Field Intensity due to Point Mass Formula 🕝					
	Formula	Example with Units	Evaluate Formula 🕝		
	$\mathbf{E} = \frac{[\mathbf{G}.] \cdot \mathbf{m'} \cdot \mathbf{m_o}}{\mathbf{I}}$	$0.0736\text{N/Kg} = \frac{6.7\text{E-}11 \cdot 9000\text{kg} \cdot 9800\text{kg}}{0.00}$			
	r	0.08 m			

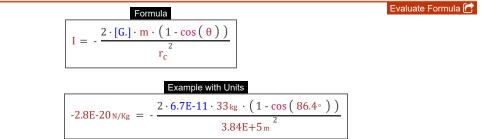
1.3) Gravitational Field of Ring Formula 🕝

Formula	Example with Units
$I = -\frac{[G.] \cdot m \cdot a}{\left(r_{\text{ring}}^{2} + a^{2}\right)^{\frac{3}{2}}}$	$-3.2\text{E-16}\text{N/Kg} = -\frac{6.7\text{E-11} \cdot 33\text{kg} \cdot 25\text{m}}{\left(6\text{m}^2 + 25\text{m}^2\right)^{\frac{3}{2}}}$

1.4) Gravitational Field of Ring given Angle at any Point Outside Ring Formula 🗹 🚽



1.5) Gravitational Field of Thin Circular Disc Formula 🕝





1.6) Gravitational Field when Point is Inside of Non Conducting Solid Sphere Formula 🕝

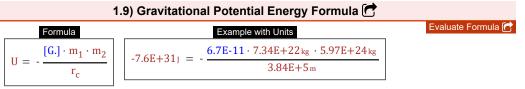
Formula	Example with Units	
$= -\frac{[G.] \cdot m \cdot a}{R^3}$	$-3.5\text{E} \cdot 15 \text{N/Kg} = - \frac{6.7\text{E} \cdot 11 \cdot 33 \text{kg} \cdot 25 \text{m}}{250 \text{m}^3}$	

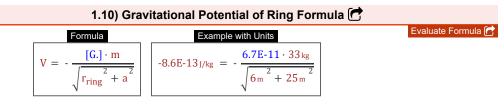
Ι

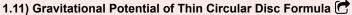
1.7) Gravitational Field when Point is Outside of Non Conducting Solid Sphere Formula 🕝

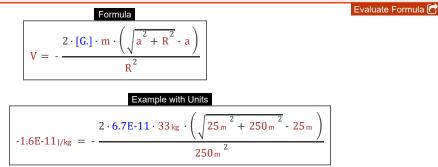
Formula	Example with Units
$I = -\frac{[G.] \cdot m}{a^2}$	$-3.5E-12 _{\text{N/Kg}} = -\frac{6.7E-11\cdot 33 _{\text{kg}}}{25 _{\text{m}}^2}$

1.8) Gravitational Potential Formula 🕝					
Formula	Example with Units	Evaluate Formula 🕝			
$V = -\frac{[G.] \cdot m}{s_{body}}$	$-2.9E-9 J/kg = -\frac{6.7E-11 \cdot 33 kg}{0.75 m}$				







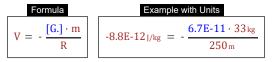




Evaluate Formula 🦳

Evaluate Formula 🦳

1.12) Gravitational Potential when Point is Inside of Conducting Solid Sphere Formula 🕝

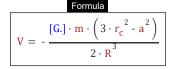


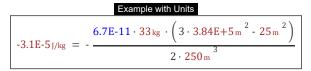
1.13) Gravitational Potential when Point is Inside of Non Conducting Solid Sphere Formula 🕝

Evaluate Formula 🕝

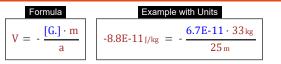
Evaluate Formula 🦳

Evaluate Formula 🦳



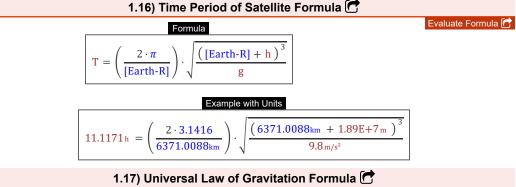


1.14) Gravitational Potential when Point is Outside of Conducting Solid Sphere Formula 🕝



1.15) Gravitational Potential when Point is Outside of Non Conducting Solid Sphere Formula





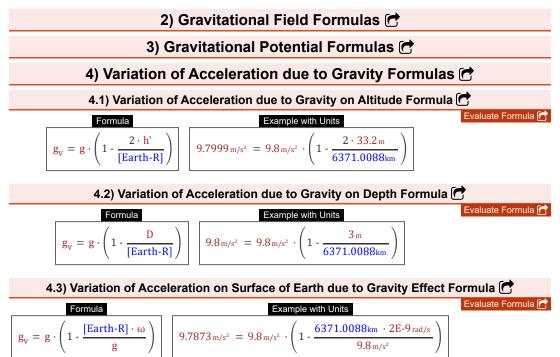
Formula

$$F' = \frac{[G.] \cdot m_1 \cdot m_2}{r_c^2}$$

$$Example with Units$$

$$Evaluate Formula (C)$$

$$Evaluate Formula (C)$$



Variables used in list of Gravitation Formulas above

- a Distance from Center to Point (Meter)
- D Depth (Meter)
- E Gravitational Field Intensity (Newton per Kilogram)
- F Force (Newton)
- F' Gravitational Force (Newton)
- **g** Acceleration due to Gravity (Meter per Square Second)
- g_v Variation of Acceleration due to Gravity (Meter per Square Second)
- h Altitude (Meter)
- **h'** Altitude for Acceleration (*Meter*)
- I Gravitational Field (Newton per Kilogram)
- I_{disc} Gravitational Field of Thin Circular Disc (Newton per Kilogram)
- I_{ring} Gravitational Field of Ring (Newton per Kilogram)
- **m** Mass (Kilogram)
- m' Mass 3 (Kilogram)
- m₁ Mass 1 (Kilogram)
- m₂ Mass 2 (Kilogram)
- m_o Mass 4 (Kilogram)
- r Distance between Two Bodies (Meter)
- R Radius (Meter)
- rc Distance between Centers (Meter)
- rring Radius of Ring (Meter)
- Sbody Displacement of Body (Meter)
- T Time period of Satellite (Hour)
- U Gravitational Potential Energy (Joule)
- U_{Disc} Gravitational Potential of Thin Circular Disc (*Joule*)
- V Gravitational Potential (Joule per Kilogram)
- V_{ring} Gravitational Potential of Ring (Joule per Kilogram)
- **θ** Theta (Degree)

Constants, Functions, Measurements used in list of Gravitation Formulas above

- constant(s): pi,
 3.14159265358979323846264338327950288
 Archimedes' constant
- constant(s): [Earth-R], 6371.0088 Earth mean radius
- constant(s): [G.], 6.67408E-11 Gravitational constant
- Functions: cos, cos(Angle) Cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse of the triangle.
- Functions: sqrt, sqrt(Number) A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Measurement: Length in Meter (m)
 Length Unit Conversion
- Measurement: Weight in Kilogram (kg) Weight Unit Conversion
- Measurement: Time in Hour (h) Time Unit Conversion
- Measurement: Acceleration in Meter per Square Second (m/s²)

Acceleration Unit Conversion 🕝

- Measurement: Energy in Joule (J) Energy Unit Conversion
- Measurement: Force in Newton (N)
 Force Unit Conversion
- Measurement: Angle in Degree (°) Angle Unit Conversion
- Measurement: Angular Velocity in Radian per Second (rad/s) Angular Velocity Unit Conversion
- Measurement: Gravitational Potential in Joule per Kilogram (J/kg) Gravitational Potential Unit Conversion
- Measurement: Gravitational Field Intensity in Newton per Kilogram (N/Kg)
 Gravitational Field Intensity Unit Conversion C



• ω Angular Velocity (Radian per Second)



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- Important Gravitation Formulas

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