



Buoyancy And Floatation Formulas

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Examples!

Conversions!

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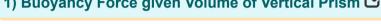
Open Calculator 2

List of 24 Buoyancy And Floatation Formulas

Buoyancy And Floatation

Buoyancy Force and Center of Buoyancy

1) Buoyancy Force given Volume of Vertical Prism 🛂



 $44566.83N = 75537N/m^3 \cdot 0.59m^3$

fx $\mathbf{F}_{\mathrm{Buoyant}} = \omega \cdot \mathbf{V}$

fx $F_{
m Buoyant} = \omega \cdot V$

 $44566.83N = 75537N/m^3 \cdot 0.59m^3$

3) Buoyant Force on Vertical Prism

 $\mathbf{F}_{\mathrm{Buoyant}} = \omega \cdot \mathrm{H}_{\mathrm{Pressurehead}} \cdot \mathrm{A}$

ex $44944.51N = 75537N/m^3 \cdot 0.7m \cdot 0.85m^2$

4) Buoyant Force when Body Floats at between two Immiscible Fluids of Specific Weights

 $\mathbf{F}_{\mathrm{Buoyant}} = \left(\omega \cdot \mathbf{v}_1 + \omega_1 \cdot \mathbf{v}_2
ight)$

Open Calculator

ex 53523.54N = (75537N/m³ · 0.001m³/kg + 65500N/m³ · 0.816m³/kg)





5) Cross Sectional Area of Prism given Buoyancy Force

 $\mathbf{A} = rac{\mathbf{F}_{\mathrm{Buoyant}}}{\mathbf{\omega} \cdot \mathbf{H}_{\mathrm{Pressurehead}}}$

Open Calculator

 $oxed{ex} 0.837433 \mathrm{m}^{2} = rac{44280 \mathrm{N}}{75537 \mathrm{N/m}^{3} \cdot 0.7 \mathrm{m}}$

6) Cross Sectional Area of Prism given Volume of Vertical Prism dV

 $oldsymbol{A} = rac{
m V}{
m H_{
m Pressurehead}}$

Open Calculator

ex $0.842857 \mathrm{m}^2 = rac{0.59 \mathrm{m}^3}{0.7 \mathrm{m}}$

7) Pressure Head Difference given Buoyancy Force

 $extbf{K}egin{aligned} \mathbf{H}_{ ext{Pressurehead}} &= rac{\mathbf{F}_{ ext{Buoyant}}}{\omega \cdot \mathbf{A}} \end{aligned}$

Open Calculator

 $ext{ex} 0.68965 ext{m} = rac{44280 ext{N}}{75537 ext{N/m}^3 \cdot 0.85 ext{m}^2}$

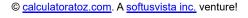
8) Pressure Head Difference given Volume of Vertical Prism dV

 $H_{ ext{Pressurehead}} = rac{ ext{V}}{ ext{A}}$

Open Calculator

ex $0.694118 \mathrm{m} = rac{0.59 \mathrm{m}^3}{0.85 \mathrm{m}^2}$







9) Specific Weight pf Fluid given Buovancy Force

 $\omega = rac{\mathrm{F}_{\mathrm{Buoyant}}}{\mathrm{H}_{\mathrm{Pressurehead}}\cdot\mathrm{A}}$

Open Calculator

 $ext{ex} \left[74420.17 ext{N/m}^3 = rac{44280 ext{N}}{0.7 ext{m} \cdot 0.85 ext{m}^2}
ight]$

10) Total Buoyant Force given Volumes of Elementary Prism Submerged in Fluids

 $\mathbf{fx} oxed{\mathrm{F}_{\mathrm{Buoyant}} = (\omega \cdot \mathrm{v}_1 + \omega_1 \cdot \mathrm{v}_2)}$

Open Calculator 🗗

 $= \frac{53523.54 \text{N} = (75537 \text{N/m}^3 \cdot 0.001 \text{m}^3/\text{kg} + 65500 \text{N/m}^3 \cdot 0.816 \text{m}^3/\text{kg}) }{ }$

11) Volume of Submerged Body given Buoyant Force on Entire Submerged Body

fx $V = rac{F_{
m Buoyant}}{\omega}$

Open Calculator

 $oxed{ex} 0.586203 \mathrm{m}^{\scriptscriptstyle 3} = rac{44280 \mathrm{N}}{75537 \mathrm{N/m}^{\scriptscriptstyle 3}}$

12) Volume of Vertical Prism 🔽

fx $V = H_{ ext{Pressurehead}} \cdot A$

Open Calculator

 $oxed{ex} \left[0.595 \mathrm{m}^{_3} = 0.7 \mathrm{m} \cdot 0.85 \mathrm{m}^{_2}
ight]$





Determination of Metacentric Height

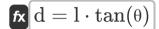
13) Angle Made by Pendulum

$$\theta = a an \left(rac{ ext{d}}{1}
ight)$$

Open Calculator 🚰

ex
$$71.56505^{\circ} = a \tan\left(\frac{150 \text{m}}{50 \text{m}}\right)$$

14) Distance Moved by Pendulum on Horizontal scale



Open Calculator

$$extbf{ex} \left[149.4342 ext{m} = 50 ext{m} \cdot an(71.5\degree)
ight]$$

15) Length of Plumb Line

$$l = rac{\mathrm{d}}{ an(heta)}$$



Metacentric Height for Floating Bodies Containing liquid

16) Distance between Centre of Gravity of these Wedges

$$\mathbf{z} = \frac{\mathbf{m}}{\mathbf{\omega} \cdot \mathbf{V}}$$

Open Calculator

ex
$$1.121911 m = \frac{50000 N^* m}{75537 N/m^3 \cdot 0.59 m^3}$$

17) Moment of Turning Couple due to Movement of Liquid

fx
$$\mathbf{m} = (\mathbf{\omega} \cdot \mathbf{V} \cdot \mathbf{z})$$

Open Calculator

18) Volume of either Wedge

$$V = \frac{m}{\omega \cdot z}$$

Open Calculator

ex
$$0.630407 \mathrm{m}^{_3} = \frac{50000 \mathrm{N^*m}}{75537 \mathrm{N/m}^{_3} \cdot 1.05 \mathrm{m}}$$



Stability of Submerged and Floating Bodies 🚰

19) Restoring Couple when Floating Body in Stable Equilibrium

Open Calculator 🗗

$$R_{Restoring \ Couple} = \left(W_{body} \cdot x \cdot \left(D \cdot \left(\frac{180}{\pi}\right)\right)\right)$$

20) Righting Couple when Floating Body in Unstable Equilibrium



Open Calculator

$$R_{Righting \; Couple} = \left(W_{body} \cdot x \cdot \left(D \cdot \left(\frac{180}{\pi}\right)\right)\right)$$

$$\boxed{12960 \mathrm{N^*m} = \left(18 \mathrm{N} \cdot 8 \mathrm{m} \cdot \left(90^{\circ} \cdot \left(\frac{180}{\pi}\right)\right)\right)}$$

21) Weight of Body given Restoring Couple



 $\mathrm{W}_{\mathrm{body}} = rac{\mathrm{R}_{\mathrm{Restoring\ Couple}}}{\mathrm{x} \cdot \left(\mathrm{D} \cdot \left(rac{180}{\pi}
ight)
ight)}$

ex
$$18\mathrm{N} = rac{12960\mathrm{N^*m}}{8\mathrm{m}\cdot\left(90^\circ\cdot\left(rac{180}{\pi}
ight)
ight)}$$





22) Weight of Body given Righting Couple

 $\mathbf{W}_{ ext{body}} = rac{\mathrm{R}_{ ext{Righting Couple}}}{\mathrm{x} \cdot \left(\mathrm{D} \cdot \left(rac{180}{\pi}
ight)
ight)}$

Open Calculator

ex $18.00139 \text{N} = \frac{12961 \text{N*m}}{8 \text{m} \cdot (90^{\circ} \cdot (\frac{180}{\pi}))}$

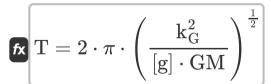
Time Period of Transverse Oscillation of a Floating Body

23) Radius of Gyration of Body given Time Period

 $k_{G} = \sqrt{\left(\left(rac{T}{2\cdot\pi}
ight)^{2}
ight)\cdot([g]\cdot GM)}$

Open Calculator 🔄

24) Time Period of One Complete Oscillations



Open Calculator

 $extbf{ex} 5.439553 ext{s} = 2 \cdot \pi \cdot \left(rac{\left(0.105 ext{m}
ight)^2}{\left[ext{g}
ight] \cdot 0.0015 ext{m}}
ight)^{rac{1}{2}}$







Variables Used

- A Cross-Sectional Area of Body (Square Meter)
- d Distance Moved (Meter)
- D Angle Between Bodies (Degree)
- F_{Buoyant} Buoyant Force (Newton)
- GM Metacentric Height (Meter)
- Hpressurehead Difference in Pressure Head (Meter)
- **k** Radius of Gyration of Body (*Meter*)
- I Length of Plumb Line (Meter)
- **m** Moment of turning Couple (Newton Meter)
- Restoring Couple Restoring Couple (Newton Meter)
- Righting Couple Righting Couple (Newton Meter)
- T Time Period of Rolling (Second)
- V Volume of Body (Cubic Meter)
- W_{body} Weight of Body (Newton)
- X Distance from submerged to Floating Body (Meter)
- Z Distance between Center of Gravity of these Wedges (Meter)
- **0** Tiltting Angle of Body (*Degree*)
- V₁ Specific Volume at Point 1 (Cubic Meter per Kilogram)
- V₂ Specific Volume at Point 2 (Cubic Meter per Kilogram)
- ω Specific Weight of body (Newton per Cubic Meter)
- ω₁ Specific Weight 2 (Newton per Cubic Meter)





Constants, Functions, Measurements used

- Constant: pi, 3.14159265358979323846264338327950288
 Archimedes' constant
- Constant: [g], 9.80665 Meter/Second²
 Gravitational acceleration on Earth
- Function: atan, atan(Number)
 Inverse trigonometric tangent function
- Function: sqrt, sqrt(Number)
 Square root function
- Function: tan, tan(Angle)
 Trigonometric tangent function
- Measurement: Length in Meter (m)
 Length Unit Conversion
- Measurement: Time in Second (s)
 Time Unit Conversion
- Measurement: Volume in Cubic Meter (m³)
 Volume Unit Conversion
- Measurement: Area in Square Meter (m²)
 Area Unit Conversion
- Measurement: Force in Newton (N)
 Force Unit Conversion
- Measurement: Angle in Degree (°)

 Angle Unit Conversion
- Measurement: Torque in Newton Meter (N*m)
 Torque Unit Conversion
- Measurement: Specific Volume in Cubic Meter per Kilogram (m³/kg)
 Specific Volume Unit Conversion





- Measurement: Moment of Force in Newton Meter (N*m)

 Moment of Force Unit Conversion
- Measurement: Specific Weight in Newton per Cubic Meter (N/m³) Specific Weight Unit Conversion





Check other formula lists

- Buoyancy And Floatation Formulas
- Culverts Formulas
- Equations of Motion and Energy
 Equation Formulas
- Flow of Compressible Fluids Formulas
- Flow Over Notches and Weirs Formulas
- Fluid Pressure and Its

 Measurement Formulas
- Fundamentals of Fluid Flow Formulas
- Hydroelectric Power Generation
 Formulas
- Hydrostatic Forces on Surfaces
 Formulas

- Impact of Free Jets Formulas
- Impulse Momentum Equation And Its Applications Formulas
- Liquids in Relative Equilibrium Formulas
- Most Economical or Most Efficient Section of Channel Formulas
- Non-uniform Flow in Channels Formulas
- Properties of Fluid Formulas
- Thermal Expansion of Pipe and Pipe Stresses Formulas
- Uniform Flow in Channels Formulas
- Water Power Engineering Formulas

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