



Fluid in Motion Formulas

Calculators!

Examples!

Conversions!

Bookmark calculatoratoz.com, unitsconverters.com

Widest Coverage of Calculators and Growing - 30,000+ Calculators! Calculate With a Different Unit for Each Variable - In built Unit Conversion! Widest Collection of Measurements and Units - 250+ Measurements!

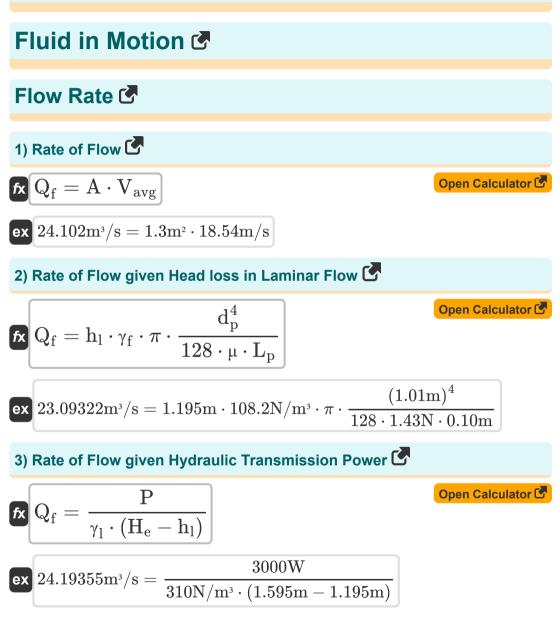
Feel free to SHARE this document with your friends!

Please leave your feedback here...





List of 17 Fluid in Motion Formulas





4) Volumetric Flow Rate at Vena Contracta

$$\begin{aligned} & \nabla_{f} = C_{d} \cdot A_{vc} \cdot \sqrt{2 \cdot [g] \cdot H_{w}} \\ & \text{Open Calculator (f)} \\ & \text{ex} \ 30.01237 \text{m}^{3}/\text{s} = 0.66 \cdot 6.43 \text{m}^{2} \cdot \sqrt{2 \cdot [g] \cdot 2.55 \text{m}} \\ & \text{5) Volumetric Flow Rate of Circular Orifice (f)} \\ & \text{for } \nabla_{f} = 0.62 \cdot a \cdot \sqrt{2 \cdot [g] \cdot H_{w}} \\ & \text{Open Calculator (f)} \\ & \text{ex} \ 29.99554 \text{m}^{3}/\text{s} = 0.62 \cdot 6.841 \text{m}^{2} \cdot \sqrt{2 \cdot [g] \cdot 2.55 \text{m}} \\ & \text{6) Volumetric Flow Rate of Rectangular Notch (f)} \\ & \text{for } \nabla_{f} = 0.62 \cdot b \cdot H \cdot \frac{2}{3} \cdot \sqrt{2 \cdot [g] \cdot H_{w}} \\ & \text{Open Calculator (f)} \\ & \text{for } \nabla_{f} = 0.62 \cdot b \cdot H \cdot \frac{2}{3} \cdot \sqrt{2 \cdot [g] \cdot H_{w}} \\ & \text{ex} \ 30.0067 \text{m}^{3}/\text{s} = 0.62 \cdot 3.88 \text{m} \cdot 2.6457 \text{m} \cdot \frac{2}{3} \cdot \sqrt{2 \cdot [g] \cdot 2.55 \text{m}} \\ & \text{7) Volumetric Flow Rate of Triangular Right Angled Notch (f)} \\ & \text{for } \nabla_{f} = 2.635 \cdot H^{\frac{5}{2}} \\ & \text{Open Calculator (f)} \\ & \text{for } \nabla_{f} = 2.635 \cdot (2.6457 \text{m})^{\frac{5}{2}} \\ & \text{ex} \ 30.00075 \text{m}^{3}/\text{s} = 2.635 \cdot (2.6457 \text{m})^{\frac{5}{2}} \end{aligned}$$



8) Volumetric Flow Rate of Venacontracta given Contraction and Velocity Open Calculator fx $V_{\mathrm{f}} = \mathrm{C_c} \cdot \mathrm{C_v} \cdot \mathrm{A_{vc}} \cdot \sqrt{2 \cdot [\mathrm{g}] \cdot \mathrm{H_w}}$ ex $30.12151 \mathrm{m^3/s} = 0.72 \cdot 0.92 \cdot 6.43 \mathrm{m^2} \cdot \sqrt{2 \cdot \mathrm{[g]} \cdot 2.55 \mathrm{m}}$ Hydrodynamics Basics 🖸 9) Metacentric Height given Time Period of Rolling 🖸 Open Calculator fx $\mathrm{H_m} = rac{(\mathrm{K_g} \cdot \pi)^2}{\left(rac{\mathrm{T_r}}{2}
ight)^2 \cdot [\mathrm{g}]}$ ex 0.730432m = $\frac{(4.43 \text{m} \cdot \pi)^2}{\left(\frac{10.4\text{s}}{2}\right)^2 \cdot [\text{g}]}$ 10) Moment of Momentum Equation 💪 fx $\mathbf{T} = \mathbf{\rho}_1 \cdot \mathbf{Q} \cdot (\mathbf{v}_1 \cdot \mathbf{R}_1 - \mathbf{v}_2 \cdot \mathbf{R}_2)$ Open Calculator ex $504.2688N*m = 4kg/m^3 \cdot 1.072m^3/s \cdot (20m/s \cdot 8.1m - 12m/s \cdot 3.7m)$



11) Poiseuille's Formula 🕑	
fx $\mathbf{Q}_{\mathrm{v}} = \Delta \mathrm{p} \cdot rac{\pi}{8} \cdot rac{\mathrm{r}_{\mathrm{p}}^{4}}{\mu_{\mathrm{v}} \cdot \mathrm{L}}$	Open Calculator 🛃
ex $10.00588 \text{m}^3/\text{s} = 3.21 \text{Pa} \cdot rac{\pi}{8} \cdot rac{(2.22 \text{m})^4}{1.02 \text{Pa}^* \text{s} \cdot 3 \text{m}}$	
12) Power 🚰	
fx $\mathbf{P}_{\mathrm{w}}=\mathbf{F}_{\mathrm{e}}\cdot\Delta\mathbf{v}$	Open Calculator 🕑
$\texttt{ex} \hspace{0.1cm} 900 \mathrm{W} = 2.5 \mathrm{N} \cdot 360 \mathrm{m/s}$	
13) Power Developed by Turbine 🕑	
fx $P_{T} = \rho_{1} \cdot Q \cdot V_{wi} \cdot v_{t}$	Open Calculator 🕑
ex $120.064W = 4kg/m^3 \cdot 1.072m^3/s \cdot 2m/s \cdot 14m/s$	
14) Power Required to Overcome Frictional Resistance in	n Laminar Flow 🕑
fx $\mathbf{P}_{\mathrm{w}} = \mathbf{\gamma} \cdot \mathbf{R}_{\mathrm{f}} \cdot \mathbf{h}_{\mathrm{f}}$	Open Calculator 🕑
$\sim 0.00 W = 21.25 N / m^3 = 24 m^3 / a = 1.2 m^3$	







5/12

15) Reynolds Number $Re = \frac{\rho_1 \cdot v_{fd} \cdot d_p}{\mu_v}$ Open Calculator ex $500.0094 = \frac{4kg/m^3 \cdot 126.24m/s \cdot 1.01m}{1.02Pa^*s}$

16) Reynolds Number given Frictional Factor of Laminar Flow 🕑



17) Reynolds Number given Length 🕑

fx
$$\mathrm{Re} =
ho_1 \cdot \mathrm{v_f} \cdot rac{\mathrm{L}}{\mathrm{V_k}}$$

ex $500 = 4\mathrm{kg/m^3} \cdot 60\mathrm{m/s} \cdot rac{3\mathrm{m}}{14.4\mathrm{kSt}}$

Open Calculator



Variables Used

- **a** Area of Orifice (Square Meter)
- A Cross Sectional Area (Square Meter)
- Avc Area of Jet at Vena Contracta (Square Meter)
- **b** Thickness of Dam (Meter)
- C_c Coefficient of Contraction
- Cd Coefficient of Discharge
- Cv Coefficient of Velocity
- d_p Diameter of Pipe (Meter)
- **f** Friction Factor
- Fe Force on Fluid Element (Newton)
- H Head of Water Above Sill of Notch (Meter)
- He Total Head at Entrance (Meter)
- h_f Head Loss (Meter)
- **h**_I Head Loss of Fluid (*Meter*)
- H_m Metacentric Height (Meter)
- H_w Head (Meter)
- Kg Radius of Gyration (Meter)
- L Length (Meter)
- Lp Length of Pipe (Meter)
- P Power (Watt)
- P_T Power Developed by Turbine (Watt)

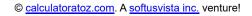




- Pw Power Generated (Watt)
- **Q** Discharge (Cubic Meter per Second)
- **Q**f Rate of Flow (Cubic Meter per Second)
- Q_v Volumetric Flow Rate of Feed to Reactor (Cubic Meter per Second)
- R₁ Radius of Curvature at Section 1 (Meter)
- R₂ Radius of Curvature at Section 2 (Meter)
- **R**_f Rate of Flow of Fluid (Cubic Meter per Second)
- r_p Pipe Radius (Meter)
- Re Reynolds Number
- **T** Torque Exerted on Wheel (Newton Meter)
- T_r Time Period of Rolling (Second)
- V₁ Velocity at Section 1-1 (Meter per Second)
- V2 Velocity at Section 2-2 (Meter per Second)
- Vavq Average Velocity (Meter per Second)
- V_f Velocity (Meter per Second)
- V_f Volumetric Flow Rate (Cubic Meter per Second)
- Vfd Fluid Velocity (Meter per Second)
- Vk Kinematic Viscosity (Kilostokes)
- V_{wi} Velocity of Whirl at Inlet (Meter per Second)
- γ Specific Weight of Liquid 1 (Newton per Cubic Meter)
- γ_f Specific Weight (Newton per Cubic Meter)
- γI Specific Weight of Liquid (Newton per Cubic Meter)
- Δp Pressure Changes (Pascal)
- Δv Change in Velocity (Meter per Second)



- **µ** Viscous Force (Newton)
- µ_v Dynamic Viscosity (Pascal Second)
- Vt Tangential Velocity at Inlet (Meter per Second)
- **p₁** Density of Liquid (*Kilogram per Cubic Meter*)





Constants, Functions, Measurements used

- Constant: pi, 3.14159265358979323846264338327950288 Archimedes' constant
- Constant: [g], 9.80665 Gravitational acceleration on Earth
- Function: 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: Time in Second (s) Time Unit Conversion
- Measurement: Area in Square Meter (m²) Area Unit Conversion
- Measurement: Pressure in Pascal (Pa) Pressure Unit Conversion
- Measurement: Speed in Meter per Second (m/s)
 Speed Unit Conversion
- Measurement: Power in Watt (W) Power Unit Conversion
- Measurement: Force in Newton (N) Force Unit Conversion
- Measurement: Volumetric Flow Rate in Cubic Meter per Second (m³/s) Volumetric Flow Rate Unit Conversion
- Measurement: Dynamic Viscosity in Pascal Second (Pa*s)
 Dynamic Viscosity Unit Conversion

- Measurement: Kinematic Viscosity in Kilostokes (kSt) Kinematic Viscosity Unit Conversion
- Measurement: **Density** in Kilogram per Cubic Meter (kg/m³) Density Unit Conversion
- Measurement: Torque in Newton Meter (N*m) Torque Unit Conversion
- Measurement: Specific Weight in Newton per Cubic Meter (N/m³) Specific Weight Unit Conversion

Check other formula lists

- Fluid Force Formulas C
- Fluid in Motion Formulas C
- Hydrostatic Fluid Formulas C
- Liquid Jet Formulas

- Pipes Formulas
- Pressure Relations Formulas
- Specific Weight Formulas

Feel free to SHARE this document with your friends!

PDF Available in

English Spanish French German Russian Italian Portuguese Polish Dutch

7/18/2024 | 4:51:58 AM UTC

Please leave your feedback here ...

