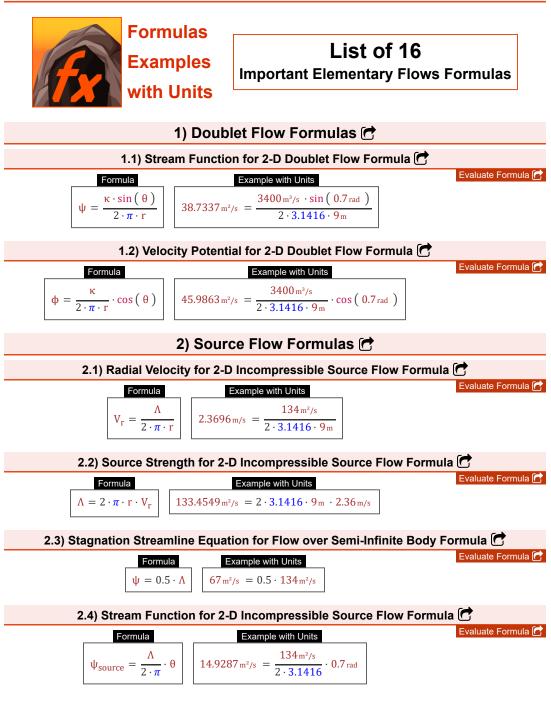
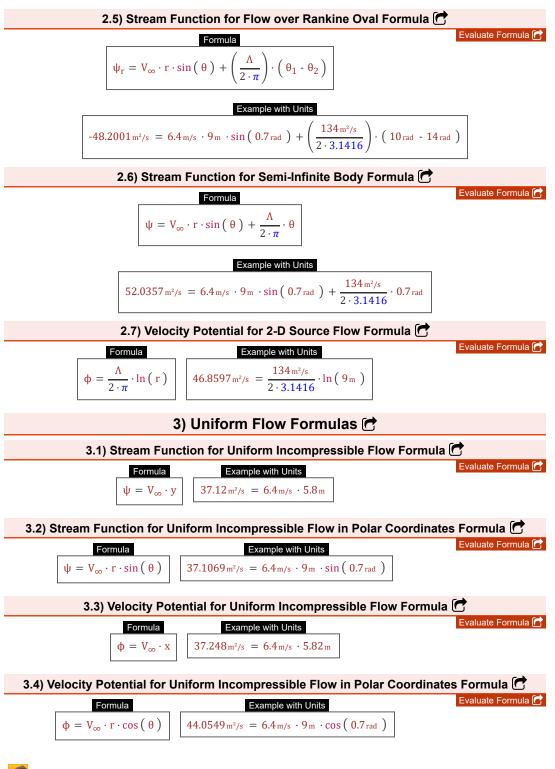
Important Elementary Flows Formulas PDF





4) Vortex Flow Formulas 🕝

4.1) Stream Function for 2-D Vortex Flow Formula 🕝

Evaluate Formula

$$\psi_{\text{vortex}} = \frac{\gamma}{2 \cdot \pi} \cdot \ln(r)$$

$$-146.8736\,\mathrm{m^2/s}\ =\ \frac{-420\,\mathrm{m^2/s}}{2\cdot 3.1416}\cdot\ln\left(9\,\mathrm{m}\right)$$

4.2) Tangential Velocity for 2-D Vortex Flow FormulaEvaluate FormulaEvaluate FormulaV
$$\theta = -\frac{\gamma}{2 \cdot \pi \cdot r}$$
 $-\frac{-420 \, \text{m}^2/\text{s}}{2 \cdot 3.1416 \cdot 9 \, \text{m}}$

4.3) Velocity Potential for 2-D Vortex Flow Formula 🕝

Formula	Example with Units
$\Phi = -\left(\frac{\gamma}{2\cdot\pi}\right)\cdot\Theta$	$46.7916 \text{m}^2\text{/s} = -\left(\frac{-420 \text{m}^2\text{/s}}{2 \cdot 3.1416}\right) \cdot 0.7 \text{rad}$



Variables used in list of Elementary Flows Formulas above

- r Radial Coordinate (Meter)
- V_{∞} Freestream Velocity (Meter per Second)
- V_r Radial Velocity (Meter per Second)
- V₀ Tangential Velocity (Meter per Second)
- X Distance on X-Axis (Meter)
- y Distance on Y-Axis (Meter)
- γ Vortex Strength (Square Meter per Second)
- θ Polar Angle (Radian)
- θ₁ Polar Angle from Source (*Radian*)
- **θ**₂ Polar Angle from Sink (*Radian*)
- K Doublet Strength (Cubic Meter per Second)
- ∧ Source Strength (Square Meter per Second)
- **\$\$ Velocity Potential** (Square Meter per Second)
- ψ Stream Function (Square Meter per Second)
- ψ_r Rankine Oval Stream Function (Square Meter per Second)
- Ψ_{source} Source Stream Function (Square Meter per Second)

Constants, Functions, Measurements used in list of Elementary Flows Formulas above

- constant(s): pi,
 3.14159265358979323846264338327950288
 Archimedes' 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: In, In(Number) The natural logarithm, also known as the logarithm to the base e, is the inverse function of the natural exponential function.
- Functions: sin, sin(Angle) Sine is a trigonometric function that describes the ratio of the length of the opposite side of a right triangle to the length of the hypotenuse.
- Measurement: Length in Meter (m)
 Length Unit Conversion
- Measurement: Speed in Meter per Second (m/s)
 Speed Unit Conversion
- Measurement: Angle in Radian (rad)
 Angle Unit Conversion
- Measurement: Volumetric Flow Rate in Cubic Meter per Second (m³/s) Volumetric Flow Rate Unit Conversion
- Measurement: Velocity Potential in Square Meter per Second (m²/s) Velocity Potential Unit Conversion



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