Important Unconfined Aquifer Formulas PDF





1.4) Discharge in Unconfined Aquifer with Base 10 Formula Formula $\begin{aligned} Formula & Evaluate Formula & Point Fo$





2.2) Length of Strainer given Discharge Formula (*) Formula $I_{st} = \left(\frac{Q \cdot \log\left(\left(\frac{R_w}{r}\right), 10\right)}{2.72 \cdot K_{WH} \cdot S_{tw}}\right) \cdot \left(\frac{S_{tw}}{2}\right)$ Example with Units $I_{10.2071m} = \left(\frac{1.01m^3/s \cdot \log\left(\left(\frac{8.6m}{7.5m}\right), 10\right)}{2.72 \cdot 10.00 \text{ cm/s} \cdot 4.93 \text{ m}}\right) \cdot \left(\frac{4.93 \text{ m}}{2}\right)$

2.3) Thickness of Aquifer for Discharge in Unconfined Aquifer with Base 10 Formula 🕝



Example with Units

$$2.7298 \text{ m} = \sqrt{2.44 \text{ m}^{2} + \frac{1.01 \text{ m}^{3}/\text{s} \cdot \log\left(\left(\frac{8.6 \text{ m}}{7.5 \text{ m}}\right), 10\right)}{1.36 \cdot 8.34}}$$

2.4) Thickness of Aquifer given Discharge in Unconfined Aquifer Formula 🕝



Example with Units

$$5.4263 \,\mathrm{m} = \sqrt{2.44 \,\mathrm{m}^2 + \frac{1.01 \,\mathrm{m}^3/\mathrm{s} \cdot \log\left(\left(\frac{8.6 \,\mathrm{m}}{7.5 \,\mathrm{m}}\right), e\right)}{3.1416 \cdot 10.00 \,\mathrm{cm/s}}}$$

2.5) Thickness of Aquifer given Drawdown Value measured at Well Formula 🕝

Formula	Example with Units	Evaluate Formula 🕝
$\mathbf{b} = \mathbf{s}_{t} + \mathbf{h}_{w}$	$3.27 \mathrm{m} = 0.83 \mathrm{m} + 2.44 \mathrm{m}$	

Evaluate Formula

Evaluate Formula

3) Coefficient of Permeability Formulas 😁

3.1) Coefficient of Permeability given Discharge and Length of Strainer Formula 🕝

FormulaExample with Units
$$K_{WH} = \frac{Q}{\frac{2.72 \cdot S_{tw} \cdot \left(l_{st} + \left(\frac{S_{tw}}{2}\right)\right)}{\log\left(\left(\frac{R_{w}}{r}\right), 10\right)}}$$
 $10.0056 \, cm/s = \frac{1.01 \, m^3/s}{\frac{2.72 \cdot 4.93 \, m \cdot \left(10.20 \, m + \left(\frac{4.93 \, m}{2}\right)\right)}{\log\left(\left(\frac{8.6 \, m}{7.5 \, m}\right), 10\right)}$

3.2) Coefficient of Permeability given Discharge from Two Wells with Base 10 Formula 🕝



3.3) Coefficient of Permeability given Discharge in Unconfined Aquifer Formula 🕝 👘



3.4) Coefficient of Permeability given Discharge in Unconfined Aquifer with Base 10 Formula



3.5) Coefficient of Permeability given Discharge of Two Wells under Consideration Formula 🕝



3.6) Coefficient of Permeability given Flow Velocity Formula 🕝





Evaluate Formula

Evaluate Formula

Evaluate Formula

Evaluate Formula



Formula

$$h_{1} = \sqrt{h_{2}^{2} - \frac{Q \cdot \log\left(\left(\frac{r_{2}}{r_{1}}\right), e\right)}{\pi \cdot K_{WH}}}$$
Example with Units

$$17.8241_{m} = \sqrt{17.8644_{m}^{2} - \frac{1.01_{m}m^{3}/s}{3.1416 \cdot 10.00_{cm}/s}}$$

4.3) Depth of Water at Point 2 given Discharge from Two Wells with Base 10 Formula 🕝



4.4) Depth of Water at Point 2 given Discharge of Two Wells under Consideration Formula 🕝



Example with Units

$$17.8902 \,\mathrm{m} = \sqrt{17.85 \,\mathrm{m}^2 + \frac{1.01 \,\mathrm{m}^3/\mathrm{s} \cdot \log\left(\left(\frac{10.0 \,\mathrm{m}}{1.07 \,\mathrm{m}}\right), e\right)}{3.1416 \cdot 10.00 \,\mathrm{cm/s}}}$$

4.5) Depth of Water in Well given Discharge in Unconfined Aquifer Formula 🕝





4.7) Drawdown at Well given Radius of Influence Formula 🕝

Formula		Example with Units		
	$s_{t} = \frac{R_{w}}{3000 \cdot \sqrt{K_{dw}}}$		$0.9065\text{m} = \frac{8.6\text{m}}{3000 \cdot \sqrt{0.00001\text{cm/s}}}$	

Evaluate Formula 🦳

Evaluate Formula

Evaluate Formula





6.4) Radial Distance of Well 1 based on Discharge from Two Wells with Base 10 Formula 🗺



6.5) Radial Distance of Well 1 based on Discharge of Two Wells under Consideration Formula C



6.6) Radial Distance of Well 2 based on Discharge from Two Wells with Base 10 Formula 🕝

Formula	Example with Units	Evaluate Formula
$R_{2} = r_{1} \cdot 10^{\frac{1.36 \cdot K_{soil} \cdot \left(h_{2}^{2} \cdot h_{1}^{2}\right)}{Q}}$	$1.07\mathrm{m} = 1.07\mathrm{m} \cdot 10^{\frac{1.36 \cdot 0.001\mathrm{cm/s} \cdot \left(17.8644\mathrm{m}^{-2} \cdot 17.85\mathrm{m}^{-2}\right)}{1.01\mathrm{m^{3}/s}}}$	

6.7) Radial Distance of Well 2 based on Discharge of Two Wells under Consideration Formula

Formula

$$R_{2} = r_{1} \cdot exp\left(\frac{\pi \cdot K_{soil} \cdot \left(h_{2}^{2} \cdot h_{1}^{2}\right)}{Q}\right)$$
Example with Units

$$1.07 \text{ m} = 1.07 \text{ m} \cdot exp\left(\frac{3.1416 \cdot 0.001 \text{ cm/s} \cdot \left(17.8644 \text{ m}^{2} \cdot 17.85 \text{ m}^{2}\right)}{1.01 \text{ m}^{3}/\text{s}}\right)$$



Evaluate Formula (

6.8) Radius of Well based on Discharge in Unconfined Aquifer Formula 🕝







Variables used in list of Unconfined Aquifer Formulas above

- Asec Area of Cross Section (Square Millimeter)
- A_{xsec} Area of Cross Section in Enviro. Engin. (Square Millimeter)
- **b** Thickness of Aquifer (Meter)
- b_w Aquifer Thickness (Meter)
- D Diameter for Unconfined Aquifer (Meter)
- **D**_p Diameter of Particle (Meter)
- h" Depth of Water in Well given Discharge (Meter)
- H Thickness of Unconfined Aquifer (Meter)
- h₁ Depth of Water 1 (Meter)
- h2 Depth of Water 2 (Meter)
- h_d Depth of Water in Well given Drawdown (Meter)
- H_i Initial Aquifer Thickness (Meter)
- hw Depth of Water (Meter)
- hwell Depth of Water in Well (Meter)
- i Hydraulic Gradient
- **i**e Hydraulic Gradient in Envi. Engi.
- **k'** Coefficient of Permeability given Rate of Flow (*Centimeter per Second*)
- K" Coefficient of Permeability given Flow Velocity (Centimeter per Second)
- K_{dw} Coefficient of Permeability at Drawdown (Centimeter per Second)
- K_s Standard Coefficient of Permeability at 20°C
- K_{soil} Coefficient of Permeability of Soil Particle (Centimeter per Second)
- K_w Coefficient of Permeability (Centimeter per Second)
- K_{WH} Coefficient of Permeability in Well Hydraulics (Centimeter per Second)
- L Length of Strainer (Meter)
- Ist Strainer Length (Meter)
- Q Discharge (Cubic Meter per Second)

Constants, Functions, Measurements used in list of Unconfined Aquifer Formulas above

- constant(s): pi,
 3.14159265358979323846264338327950288
 Archimedes' constant
- constant(s): e,
 2.71828182845904523536028747135266249
 Napier's constant
- Functions: exp, exp(Number) n an exponential function, the value of the function changes by a constant factor for every unit change in the independent variable.
- Functions: log, log(Base, Number) Logarithmic function is an inverse function to exponentiation.
- 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: Area in Square Millimeter (mm²) Area Unit Conversion
- Measurement: Volumetric Flow Rate in Cubic Meter per Second (m³/s) Volumetric Flow Rate Unit Conversion
- Measurement: Dynamic Viscosity in Poise (P)
 Dynamic Viscosity Unit Conversion
- Measurement: Mass Concentration in Kilogram per Cubic Meter (kg/m³) Mass Concentration Unit Conversion

- r Radius of Well (Meter)
- r₁ Radial Distance at Observation Well 1 (Meter)
- R₁ Radial Distance 1 (Meter)
- r2 Radial Distance at Observation Well 2 (Meter)
- R2 Radial Distance at Well 2 (Meter)
- **r**_w Radius of Well given Discharge (Meter)
- Rw Radius of Influence (Meter)
- **r**["]Radius of Well in Well Hydraulics (Meter)
- **r1** Radial Distance at Well 1 (Meter)
- r1" Observation Well 1 Radial Distance (Meter)
- **s**t Total Drawdown (Meter)
- Stw Total Drawdown in Well (Meter)
- V_{aq} Rate of Flow in Aquifer (*Cubic Meter per Second*)
- V_f Flow Velocity for Unconfined Aquifer (Meter per Second)
- V_{fwh} Flow Velocity (Meter per Second)
- V_{uaq} Rate of Flow in Unconfined Aquifer (*Cubic* Meter per Second)
- Vwh' Velocity of Flow (Meter per Second)
- **µviscosity** Dynamic Viscosity for Aquifer (Poise)
- p Mass Density (Kilogram per Cubic Meter)



- Important Confined Aquifer
 Formulas (*)
- Important Unconfined Aquifer
 Formulas C

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Simple fraction C

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