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Constant Level Pumping Test Formulas

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List of 25 Constant Level Pumping Test Formulas

Constant Level Pumping Test

Cross Sectional Area of Well

1) Cross-sectional Area of Flow into well given Discharge

$$fx \quad A_{csw} = \left(\frac{Q}{V} \right)$$

Open Calculator 

$$ex \quad 13.02632m^2 = \left(\frac{0.99m^3/s}{0.076m/s} \right)$$

2) Cross-sectional Area of Flow into well given Discharge from Open Well

$$fx \quad A_{csw} = \frac{Q}{C \cdot H}$$

Open Calculator 

$$ex \quad 14.14286m^2 = \frac{0.99m^3/s}{0.01m/s \cdot 7m}$$



3) Cross-sectional Area of Well given Specific Capacity

$$fx \quad A_{sec} = \frac{K_b}{K_a}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$ex \quad 2.495m^2 = \frac{4.99m^3/hr}{2m/h}$$

4) Cross-sectional Area of Well given Specific Capacity for Clay Soil

$$fx \quad A_{csw} = \frac{Q}{0.25 \cdot H''}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$ex \quad 13.2m^2 = \frac{0.99m^3/s}{0.25 \cdot 0.3}$$

5) Cross-sectional Area of Well given Specific Capacity for Coarse Sand

$$fx \quad A_{csw} = \frac{Q}{1 \cdot H_c}$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$ex \quad 14.14286m^2 = \frac{0.99m^3/s}{1 \cdot 0.07}$$

6) Cross-sectional Area of Well given Specific Capacity for Fine Sand

$$fx \quad A_{csw} = \frac{Q}{0.5 \cdot H_f}$$

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754_img.jpg\)](#)

$$ex \quad 13.2m^2 = \frac{0.99m^3/s}{0.5 \cdot 0.15}$$



Depression Head

7) Constant Depression Head given Specific Capacity

$$fx \quad H' = \frac{Q}{A_{csw} \cdot S_{si}}$$

[Open Calculator !\[\]\(23d9fc146e83b5c3013cfa32c784f8d5_img.jpg\)](#)

$$ex \quad 0.038077 = \frac{0.99m^3/s}{13m^2 \cdot 2.0m/s}$$

8) Constant Depression Head given Specific Capacity for Clay Soil

$$fx \quad H'' = \frac{Q}{A_{csw} \cdot 0.25}$$

[Open Calculator !\[\]\(aa53ad6fea213b8b2226d3077e30533a_img.jpg\)](#)

$$ex \quad 0.304615 = \frac{0.99m^3/s}{13m^2 \cdot 0.25}$$

9) Constant Depression Head given Specific Capacity for Coarse Sand

$$fx \quad H_c = \frac{Q}{A_{csw} \cdot 1}$$

[Open Calculator !\[\]\(626ce8ac21792b9405bfddfea8e0c96a_img.jpg\)](#)

$$ex \quad 0.076154 = \frac{0.99m^3/s}{13m^2 \cdot 1}$$



10) Constant Depression Head given Specific Capacity for Fine Sand 

$$fx \quad H_f = \frac{Q}{A_{CSW} \cdot 0.5}$$

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

$$ex \quad 0.152308 = \frac{0.99m^3/s}{13m^2 \cdot 0.5}$$

11) Depression Head given Discharge 

$$fx \quad H = \left(\frac{Q}{A_{CSW} \cdot C} \right)$$

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021_img.jpg\)](#)

$$ex \quad 7.615385m = \left(\frac{0.99m^3/s}{13m^2 \cdot 0.01m/s} \right)$$

Discharge from Well 12) Discharge from Open Well given Depression Head 

$$fx \quad Q = (C \cdot A_{CSW} \cdot H)$$

[Open Calculator !\[\]\(0fb13ad0bfa3d86868cdd3883e5665b3_img.jpg\)](#)

$$ex \quad 0.91m^3/s = (0.01m/s \cdot 13m^2 \cdot 7m)$$


13) Discharge from Open Well given Mean Velocity of Water Percolating 

$$fx \quad Q = A_{CSW} \cdot V$$

[Open Calculator !\[\]\(e50091943b385fe16d3277389202856f_img.jpg\)](#)

$$ex \quad 0.988m^3/s = 13m^2 \cdot 0.076m/s$$



14) Discharge from Well given Specific Capacity 

$$fx \quad Q = S_{si} \cdot A_{CSW} \cdot H'$$

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0_img.jpg\)](#)

$$ex \quad 0.988\text{m}^3/\text{s} = 2.0\text{m/s} \cdot 13\text{m}^2 \cdot 0.038$$

15) Discharge from Well given Specific Capacity for Clay Soil 

$$fx \quad Q = 0.25 \cdot A_{CSW} \cdot H''$$

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5_img.jpg\)](#)

$$ex \quad 0.975\text{m}^3/\text{s} = 0.25 \cdot 13\text{m}^2 \cdot 0.3$$

16) Discharge from Well given Specific Capacity for Coarse Sand 

$$fx \quad Q = 1 \cdot A_{CSW} \cdot H_c$$

[Open Calculator !\[\]\(ab4e2b3fc7e7887b7a72f548aa6f5e60_img.jpg\)](#)

$$ex \quad 0.91\text{m}^3/\text{s} = 1 \cdot 13\text{m}^2 \cdot 0.07$$

17) Discharge from Well given Specific Capacity for Fine Sand 

$$fx \quad Q = 0.5 \cdot A_{CSW} \cdot H_f$$

[Open Calculator !\[\]\(5abce1a84a655b073239ab33e1199487_img.jpg\)](#)

$$ex \quad 0.975\text{m}^3/\text{s} = 0.5 \cdot 13\text{m}^2 \cdot 0.15$$

18) Mean Velocity of Water Percolating into Well 

$$fx \quad V = \frac{Q}{A_{CSW}}$$

[Open Calculator !\[\]\(111c5272ee3f91361f0d2e3665dd6ad0_img.jpg\)](#)

$$ex \quad 0.076154\text{m/s} = \frac{0.99\text{m}^3/\text{s}}{13\text{m}^2}$$



19) Percolation Intensity Coefficient given Discharge 

$$fx \quad C = \frac{Q}{A_{CSW} \cdot H}$$

Open Calculator 

$$ex \quad 0.010879m/s = \frac{0.99m^3/s}{13m^2 \cdot 7m}$$

20) Time in Hours given Specific Capacity of Open Well 

$$fx \quad t = \left(\frac{1}{K_a} \right) \cdot \log \left(\left(\frac{h_d}{h_{w2}} \right), e \right)$$

Open Calculator 

$$ex \quad 0.503397h = \left(\frac{1}{2m/h} \right) \cdot \log \left(\left(\frac{27m}{10m} \right), e \right)$$

21) Time in Hours given Specific Capacity of Open Well with Base 10 

$$fx \quad t = \left(\frac{2.303}{K_a} \right) \cdot \log \left(\left(\frac{h_d}{h_{w2}} \right), 10 \right)$$

Open Calculator 

$$ex \quad 2.669441h = \left(\frac{2.303}{2m/h} \right) \cdot \log \left(\left(\frac{27m}{10m} \right), 10 \right)$$



Specific Capacity

22) Specific Capacity given Discharge from Well

$$\text{fx } S_{si} = \frac{Q}{A_{csw} \cdot H'}$$

[Open Calculator !\[\]\(96cc62f861fdd6e50510c0224a756dff_img.jpg\)](#)

$$\text{ex } 2.004049\text{m/s} = \frac{0.99\text{m}^3/\text{s}}{13\text{m}^2 \cdot 0.038}$$

23) Specific Capacity of Open Well

$$\text{fx } K_a = \left(\frac{1}{t} \right) \cdot \log \left(\left(\frac{h_d}{h_{w2}} \right), e \right)$$

[Open Calculator !\[\]\(f95dab70c751fda7d824b8b03650f7aa_img.jpg\)](#)

$$\text{ex } 0.251699\text{m/h} = \left(\frac{1}{4\text{h}} \right) \cdot \log \left(\left(\frac{27\text{m}}{10\text{m}} \right), e \right)$$


24) Specific Capacity of Open Well given Constant Depending upon Soil at Base

$$\text{fx } K_a = \frac{K_b}{A_{csw}}$$

[Open Calculator !\[\]\(e9474ce1d70442456f8fe9c393ea149c_img.jpg\)](#)

$$\text{ex } 0.383846\text{m/h} = \frac{4.99\text{m}^3/\text{hr}}{13\text{m}^2}$$



25) Specific Capacity of Open Well with Base 10 [Open Calculator !\[\]\(666e09182d4cd268646ea700ea60dcdf_img.jpg\)](#)

$$fx \quad K_a = \left(\frac{2.303}{t} \right) \cdot \log \left(\left(\frac{h_d}{h_{w2}} \right), 10 \right)$$

$$ex \quad 1.33472\text{m/h} = \left(\frac{2.303}{4\text{h}} \right) \cdot \log \left(\left(\frac{27\text{m}}{10\text{m}} \right), 10 \right)$$








Variables Used

- A_{CSW} Cross-Sectional Area of Well (Square Meter)
- A_{sec} Cross-Sectional Area given Specific Capacity (Square Meter)
- C Percolation Intensity Coefficient (Meter per Second)
- H Depression Height (Meter)
- H' Constant Depression Head
- H'' Constant Depression Head for Clay Soil
- H_C Constant Depression Head for Coarse Sand
- h_d Depression Head (Meter)
- H_f Constant Depression Head for Fine Soil
- h_{w2} Depression Head in Well 2 (Meter)
- K_a Specific Capacity (Meter per Hour)
- K_b Constant Dependent on Base Soil (Cubic Meter per Hour)
- Q Discharge in Well (Cubic Meter per Second)
- S_{si} Specific Capacity in SI unit (Meter per Second)
- t Time (Hour)
- V Mean Velocity (Meter per Second)



Constants, Functions, Measurements used

- **Constant:** **e**, 2.71828182845904523536028747135266249
Napier's constant
- **Function:** **log**, $\log(\text{Base}, \text{Number})$
Logarithmic function is an inverse function to exponentiation.
- **Measurement:** **Length** in Meter (m)
Length Unit Conversion 
- **Measurement:** **Time** in Hour (h)
Time Unit Conversion 
- **Measurement:** **Area** in Square Meter (m^2)
Area Unit Conversion 
- **Measurement:** **Speed** in Meter per Second (m/s), Meter per Hour (m/h)
Speed Unit Conversion 
- **Measurement:** **Volumetric Flow Rate** in Cubic Meter per Second (m^3/s), Cubic Meter per Hour (m^3/hr)
Volumetric Flow Rate Unit Conversion 



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