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Recuperation Test Formulas

Calculators! Examples! Conversions!

List of 34 Recuperation Test Formulas

Recuperation Test

Constant Depending upon Base Soil

1) Constant Depending upon Soil at Base of Well

Open Calculator

fx $$K = \left(\frac{A_{cs}}{t}\right) \cdot \log\left(\left(\frac{h_d}{h_{w2}}\right), e\right)$$

ex $$5.03397 = \left(\frac{20m^2}{4h}\right) \cdot \log\left(\left(\frac{27m}{10m}\right), e\right)$$

2) Constant Depending upon Soil at Base of Well given Clay Soil

Open Calculator

fx $$K = 0.25 \cdot A_{cs}$$

ex $$5 = 0.25 \cdot 20m^2$$

3) Constant Depending upon Soil at Base of Well given Fine Sand

Open Calculator

fx $$K = 0.5 \cdot A_{csw}$$

ex $$6.5 = 0.5 \cdot 13m^2$$

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

Open Calculator

$$K = A_{sec} \cdot S_{si}$$

$$4.99 = 2.495\text{m}^2 \cdot 2.0\text{m/s}$$

5) Constant Depending upon Soil at Base of Well with Base 10

Open Calculator

$$K = \left(\frac{A_{sec} \cdot 2.303}{t}\right) \cdot \log\left(\left(\frac{h_d}{h_{w2}}\right), 10\right)$$

$$3.330127 = \left(\frac{2.495\text{m}^2 \cdot 2.303}{4\text{h}}\right) \cdot \log\left(\left(\frac{27\text{m}}{10\text{m}}\right), 10\right)$$

6) Constant Depression Head given Discharge and Time in Hours

Open Calculator

$$H' = \frac{Q}{\frac{2.303 \cdot A_{csw} \cdot \log\left(\left(\frac{h_d}{h_{w2}}\right), 10\right)}{t}}$$

$$0.057056 = \frac{0.99\text{m}^3/\text{s}}{\frac{2.303 \cdot 13\text{m}^2 \cdot \log\left(\left(\frac{27\text{m}}{10\text{m}}\right), 10\right)}{4\text{h}}}$$

7) Constant Depression Head given Discharge from Well

Open Calculator

$$H' = \frac{Q}{K}$$

$$0.198 = \frac{0.99\text{m}^3/\text{s}}{5.0}$$

Discharge in Well

8) Discharge in Well given Constant Depression Head and Area of Well

Open Calculator

fx $$Q = \frac{2.303 \cdot A_{csw} \cdot H' \cdot \log\left(\left(\frac{h_d}{h_{w2}}\right), 10\right)}{t}$$

ex $$0.000183\text{m}^3/\text{s} = \frac{2.303 \cdot 13\text{m}^2 \cdot 0.038 \cdot \log\left(\left(\frac{27\text{m}}{10\text{m}}\right), 10\right)}{4\text{h}}$$

9) Discharge in Well under Constant Depression Head

Open Calculator

fx $$Q = K \cdot H'$$

ex $$0.19\text{m}^3/\text{s} = 5.0 \cdot 0.038$$

Cross Sectional Area of Well

10) Cross-sectional Area of Well given Constant Depending upon Soil at Base

Open Calculator

fx $$A_{csw} = \frac{K_b}{\left(\frac{1}{t}\right) \cdot \log\left(\left(\frac{h1'}{h_{w2}}\right), e\right)}$$

ex $$13.83522\text{m}^2 = \frac{4.99\text{m}^3/\text{hr}}{\left(\frac{1}{4\text{h}}\right) \cdot \log\left(\left(\frac{20.0\text{m}}{10\text{m}}\right), e\right)}$$

11) Cross-sectional Area of Well given Constant Depending upon Soil at Base with Base 10

Open Calculator

$$A_{sec} = \frac{K_b}{\left(\frac{2.303}{t}\right) \cdot \log\left(\left(\frac{h1'}{h_{w2}}\right), 10\right)}$$

$$2.609014\text{m}^2 = \frac{4.99\text{m}^3/\text{hr}}{\left(\frac{2.303}{4\text{h}}\right) \cdot \log\left(\left(\frac{20.0\text{m}}{10\text{m}}\right), 10\right)}$$

12) Cross-sectional Area of Well given Discharge from Well

Open Calculator

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

$$13.02632\text{m}^2 = \frac{0.99\text{m}^3/\text{s}}{2.0\text{m/s} \cdot 0.038}$$

Depression Head after Pumping Stopped

13) Depression Head in Well at Time T after Pumping Stopped

Open Calculator

$$h_d = \frac{h1'}{\exp(K_a \cdot t)}$$

$$19.9556\text{m} = \frac{20.0\text{m}}{\exp(2\text{m/h} \cdot 4\text{h})}$$

14) Depression Head in Well at Time T after Pumping Stopped and Clay Soil is Present

Open Calculator

$$h_{dp} = \frac{h_{w1}}{10^{\left(0.25 \cdot \frac{t}{3600}\right)}}$$

$$0.3\text{m} = \frac{3\text{m}}{10^{\left(0.25 \cdot \frac{4\text{h}}{3600}\right)}}$$

15) Depression Head in Well at Time T after Pumping Stopped and Fine Sand is Present

Open Calculator

$$h_{dp} = \frac{h_{w1}}{10^{\left(\frac{0.5}{2.303}\right) \cdot \frac{t}{3600}}}$$

$$0.406152\text{m} = \frac{3\text{m}}{10^{\left(\frac{0.5}{2.303}\right) \cdot \frac{4\text{h}}{3600}}}$$

16) Depression Head in Well at Time T after Pumping Stopped with Base 10 and Clay soil is Present

Open Calculator

$$h_{dp} = \frac{h_{w1}}{10^{\frac{0.25 \cdot \frac{t}{3600}}{2.303}}}$$

$$1.103837\text{m} = \frac{3\text{m}}{10^{\frac{0.25 \cdot \frac{4\text{h}}{3600}}{2.303}}}$$

17) Depression Head in Well at Time T after Pumping Stopped with Base 10 and Fine Sand is Present

Open Calculator

$$h_{dp} = \left(\frac{h_{w1}}{10^{\left((0.5) \cdot \frac{\frac{t}{3600}}{2.303} \right)}} \right)$$

$$0.406152\text{m} = \left(\frac{3\text{m}}{10^{\left((0.5) \cdot \frac{\frac{4\text{h}}{3600}}{2.303} \right)}} \right)$$

18) Depression Head in Well at Time T given Pumping Stopped and Constant

Open Calculator

$$h_{dp} = \frac{h_{w1}}{\exp\left(\frac{K_b \cdot t}{A_{csw}} \right)}$$

$$0.646119\text{m} = \frac{3\text{m}}{\exp\left(\frac{4.99\text{m}^3/\text{hr} \cdot 4\text{h}}{13\text{m}^2} \right)}$$

19) Depression Head in Well at Time T given Pumping Stopped and Constant with Base 10

Open Calculator

$$h_{dp} = \frac{h_{w1}}{10^{\frac{K_b \cdot t}{A_{csw} \cdot 2.303}}}$$

$$0.646297\text{m} = \frac{3\text{m}}{10^{\frac{4.99\text{m}^3/\text{hr} \cdot 4\text{h}}{13\text{m}^2 \cdot 2.303}}}$$

Depression Head when Pumping Stopped

20) Depression Head in well given pumping stopped and clay soil is present

Open Calculator

fx $$h_d = h_{w2} \cdot \exp(0.25 \cdot \Delta t)$$

ex $$34.90343\text{m} = 10\text{m} \cdot \exp(0.25 \cdot 5\text{s})$$

21) Depression Head in Well given Pumping Stopped and Coarse Sand is Present

Open Calculator

fx $$h_d = h_{w2} \cdot \exp(1 \cdot \Delta_t)$$

ex $$27.45601\text{m} = 10\text{m} \cdot \exp(1 \cdot 1.01\text{s})$$

22) Depression Head in Well given Pumping Stopped and Constant

Open Calculator

fx $$h_d = h_{w2} \cdot \exp\left(\frac{K \cdot t}{A_{cs}}\right)$$

ex $$27.18282\text{m} = 10\text{m} \cdot \exp\left(\frac{5.0 \cdot 4\text{h}}{20\text{m}^2}\right)$$

23) Depression Head in Well given Pumping Stopped and Constant with Base 10

Open Calculator

fx $$h_d = h_{w2} \cdot 10^{\frac{K \cdot t}{A_{cs} \cdot 2.303}}$$

ex $$27.17792\text{m} = 10\text{m} \cdot 10^{\frac{5.0 \cdot 4\text{h}}{20\text{m}^2 \cdot 2.303}}$$

24) Depression Head in Well given Pumping Stopped and Fine Sand is Present

Open Calculator

fx $$h_d = h_{w2} \cdot \exp(0.5 \cdot \Delta_t)$$

ex $$16.56986\text{m} = 10\text{m} \cdot \exp(0.5 \cdot 1.01\text{s})$$

25) Depression Head in Well given Pumping Stopped with Base 10 and Clay soil is Present

Open Calculator

fx $$h_d = h_{w2} \cdot 10^{\frac{0.25 \cdot \Delta t}{2.303}}$$

ex $$34.89557\text{m} = 10\text{m} \cdot 10^{\frac{0.25 \cdot 5\text{s}}{2.303}}$$

26) Depression Head in Well given Pumping Stopped with Base 10 and Coarse Sand is Present

Open Calculator

fx $$h_d = h_{w2} \cdot 10^{\frac{1 \cdot \Delta_t}{2.303}}$$

ex $$27.45101\text{m} = 10\text{m} \cdot 10^{\frac{1 \cdot 1.01\text{s}}{2.303}}$$

27) Depression Head in Well given Pumping Stopped with Discharge

Open Calculator

fx $$h_d = h_{w2} \cdot 10^{\frac{Q \cdot \Delta_t}{A_{cs} \cdot H' \cdot 2.303}}$$

ex $$37.26319\text{m} = 10\text{m} \cdot 10^{\frac{0.99\text{m}^3/\text{s} \cdot 1.01\text{s}}{20\text{m}^2 \cdot 0.038 \cdot 2.303}}$$

Recuperate Time

28) Time in Hours given Clay Soil

Open Calculator

$$t = \left(\frac{1}{0.25}\right) \cdot \log\left(\left(\frac{h_d}{h_{w2}}\right), e\right)$$

$$4.027176\text{h} = \left(\frac{1}{0.25}\right) \cdot \log\left(\left(\frac{27\text{m}}{10\text{m}}\right), e\right)$$

29) Time in Hours given Coarse Sand

Open Calculator

$$t = \log\left(\left(\frac{h_d}{h_{w2}}\right), e\right)$$

$$1.006794\text{h} = \log\left(\left(\frac{27\text{m}}{10\text{m}}\right), e\right)$$

30) Time in Hours given Constant Depending upon Soil at Base

Open Calculator

$$t = \left(\frac{A_{csw}}{K}\right) \cdot \log\left(\left(\frac{h_d}{h_{w2}}\right), e\right)$$

$$2.617665\text{h} = \left(\frac{13\text{m}^2}{5.0}\right) \cdot \log\left(\left(\frac{27\text{m}}{10\text{m}}\right), e\right)$$

31) Time in Hours given Constant Depression Head and Area of Well

Open Calculator

$$t = \frac{2.303 \cdot A_{csw} \cdot H' \cdot \log\left(\left(\frac{h_d}{h_{w2}}\right), 10\right)}{Q}$$

$$2.664048\text{h} = \frac{2.303 \cdot 13\text{m}^2 \cdot 0.038 \cdot \log\left(\left(\frac{27\text{m}}{10\text{m}}\right), 10\right)}{0.99\text{m}^3/\text{s}}$$

32) Time in Hours given Fine Sand

Open Calculator

$$t = \left(\frac{1}{0.5}\right) \cdot \log\left(\left(\frac{h_d}{h_{w2}}\right), e\right)$$

$$2.013588\text{h} = \left(\frac{1}{0.5}\right) \cdot \log\left(\left(\frac{27\text{m}}{10\text{m}}\right), e\right)$$

33) Time in Hours with Base 10 given Coarse Sand

Open Calculator

$$t = \left(\frac{2.303}{1}\right) \cdot \log\left(\left(\frac{h_d}{h_{w2}}\right), 10\right)$$

$$5.338881\text{h} = \left(\frac{2.303}{1}\right) \cdot \log\left(\left(\frac{27\text{m}}{10\text{m}}\right), 10\right)$$

34) Time in Hours with Base 10 given Fine Sand

Open Calculator

fx
$$t = \left(\frac{2.303}{0.5}\right) \cdot \log\left(\left(\frac{h_d}{h_{w2}}\right), 10\right)$$

ex
$$10.67776\text{h} = \left(\frac{2.303}{0.5}\right) \cdot \log\left(\left(\frac{27\text{m}}{10\text{m}}\right), 10\right)$$

Variables Used

- A_{cs} Cross Sectional Area *(Square Meter)*
- A_{csw} Cross-Sectional Area of Well *(Square Meter)*
- A_{sec} Cross-Sectional Area given Specific Capacity *(Square Meter)*
- **H'** Constant Depression Head
- h_d Depression Head *(Meter)*
- h_{dp} Depression Head after Pumping Stopped *(Meter)*
- h_{w1} Depression Head in Well 1 *(Meter)*
- h_{w2} Depression Head in Well 2 *(Meter)*
- **h1'** Depression Head in Well *(Meter)*
- **K** Constant
- 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)*
- Δ_t Time Interval *(Second)*
- **Δt** Total Time Interval *(Second)*

Constants, Functions, Measurements used

- Constant: **e**, 2.71828182845904523536028747135266249
  Napier's constant
- Function: **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.
- Function: **log**, log(Base, Number)
  Logarithmic function is an inverse function to exponentiation.
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Time** in Hour (h), Second (s)
  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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- Constant Level Pumping Test Formulas
- Recuperation Test Formulas

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