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Peak Drainage Discharge Formula Formulas

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List of 18 Peak Drainage Discharge Formula Formulas

Peak Drainage Discharge Formula

Peak Drainage Discharge by Empirical Formula

Burkli Ziegler Formula

1) Drainage Area for Peak Rate of Runoff

$$\text{fx } A_D = \left(\frac{Q_{BZ} \cdot 455}{K' \cdot I_{BZ} \cdot \sqrt{S_o}} \right)^2$$

[Open Calculator !\[\]\(3211b5d1d968fc1665909b34f9f16010_img.jpg\)](#)

$$\text{ex } 30\text{ha} = \left(\frac{1.34\text{m}^3/\text{s} \cdot 455}{251878.2 \cdot 7.5\text{cm}/\text{h} \cdot \sqrt{0.045}} \right)^2$$

2) Maximum Rainfall Intensity given Peak Rate of Runoff

$$\text{fx } I_{BZ} = 455 \cdot \frac{Q_{BZ}}{K' \cdot \sqrt{S_o} \cdot A_D}$$

[Open Calculator !\[\]\(9c2e8d1b5bd77cb5c9f83b7a9cff79fd_img.jpg\)](#)

$$\text{ex } 0.002083\text{cm}/\text{h} = 455 \cdot \frac{1.34\text{m}^3/\text{s}}{251878.2 \cdot \sqrt{0.045} \cdot 30\text{ha}}$$



3) Peak Rate of Runoff from Burkli-Ziegler Formula

[Open Calculator !\[\]\(4729e517bc6a7cd81c8025b9646574fb_img.jpg\)](#)

$$\text{fx } Q_{\text{BZ}} = \left(\frac{K' \cdot I_{\text{BZ}} \cdot A_{\text{D}}}{455} \right) \cdot \sqrt{\frac{S_{\text{o}}}{A_{\text{D}}}}$$

$$\text{ex } 482400 \text{m}^3/\text{s} = \left(\frac{251878.2 \cdot 7.5 \text{cm/h} \cdot 30 \text{ha}}{455} \right) \cdot \sqrt{\frac{0.045}{30 \text{ha}}}$$

4) Runoff Coefficient for Peak Rate of Runoff

[Open Calculator !\[\]\(e474458956c9a37fbf9586ddb60a7fa1_img.jpg\)](#)

$$\text{fx } K' = \frac{455 \cdot Q_{\text{BZ}}}{I_{\text{BZ}} \cdot \sqrt{S_{\text{o}} \cdot A_{\text{D}}}}$$

$$\text{ex } 251878.2 = \frac{455 \cdot 1.34 \text{m}^3/\text{s}}{7.5 \text{cm/h} \cdot \sqrt{0.045 \cdot 30 \text{ha}}}$$

5) Slope of Ground Surface given Peak Rate of Runoff

[Open Calculator !\[\]\(4fe57c3593bf1b21d272ae7ac8dfaf77_img.jpg\)](#)

$$\text{fx } S_{\text{o}} = \left(\frac{Q_{\text{BZ}} \cdot 455}{I_{\text{BZ}} \cdot K' \cdot \sqrt{A_{\text{D}}}} \right)^2$$

$$\text{ex } 0.045 = \left(\frac{1.34 \text{m}^3/\text{s} \cdot 455}{7.5 \text{cm/h} \cdot 251878.2 \cdot \sqrt{30 \text{ha}}} \right)^2$$



Dicken's Formula

6) Catchment Area given Peak Rate of Runoff

$$\text{fx } A_{\text{km}} = \left(\frac{Q_{\text{PD}}}{x} \right)^{\frac{4}{3}}$$

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

$$\text{ex } 2.5\text{km}^2 = \left(\frac{628716.7\text{m}^3/\text{s}}{10.00} \right)^{\frac{4}{3}}$$

7) Factors Dependent Constant given Peak Rate of Runoff

$$\text{fx } x = \left(\frac{Q_{\text{PD}}}{(A_{\text{km}})^{\frac{3}{4}}} \right)$$

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

$$\text{ex } 10 = \left(\frac{628716.7\text{m}^3/\text{s}}{(2.5\text{km}^2)^{\frac{3}{4}}} \right)$$

8) Peak Rate Runoff from Dicken's Formula

$$\text{fx } Q_{\text{PD}} = x \cdot (A_{\text{km}})^{\frac{3}{4}}$$

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

$$\text{ex } 628716.7\text{m}^3/\text{s} = 10.00 \cdot (2.5\text{km}^2)^{\frac{3}{4}}$$



Dredge or Burge's Formula

9) Catchment Area given Peak Rate of Runoff from Dredge Formula

$$\text{fx } A_{\text{km}} = \frac{Q_d \cdot (L)^{\frac{2}{3}}}{19.6}$$

[Open Calculator !\[\]\(74d4806277d7e73349d8e8c0897931e9_img.jpg\)](#)

$$\text{ex } 2.5\text{km}^2 = \frac{212561.2\text{m}^3/\text{s} \cdot (3.5\text{km})^{\frac{2}{3}}}{19.6}$$

10) Peak Rate of Runoff from Dredge Formula

$$\text{fx } Q_d = 19.6 \cdot \left(\frac{A_{\text{km}}}{(L)^{\frac{2}{3}}} \right)$$

[Open Calculator !\[\]\(8bba887393ca45b761e5cb49e755e762_img.jpg\)](#)

$$\text{ex } 212561.2\text{m}^3/\text{s} = 19.6 \cdot \left(\frac{2.5\text{km}^2}{(3.5\text{km})^{\frac{2}{3}}} \right)$$

Inglis Formula

11) Catchment Area given Peak Rate of Runoff from Inglis Formula

$$\text{fx } A_{\text{km}} = \left(\frac{Q_I}{123} \right)^2$$

[Open Calculator !\[\]\(799877f5c2f906134441300079881630_img.jpg\)](#)

$$\text{ex } 2.499998\text{km}^2 = \left(\frac{194.48\text{m}^3/\text{s}}{123} \right)^2$$



12) Peak Rate of Runoff from Inglis Formula Approximate

$$\text{fx } Q_I = 123 \cdot \sqrt{A_{\text{km}}}$$

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

$$\text{ex } 194.4801\text{m}^3/\text{s} = 123 \cdot \sqrt{2.5\text{km}^2}$$

Nawab Jung Bahadur Formula

13) Peak Rate of Runoff from Nawab Jung Bahadur Formula

$$\text{fx } Q_{\text{NJB}} = C_2 \cdot (A_{\text{km}})^{0.93 - \left(\frac{1}{14}\right) \cdot \log 10(A_{\text{km}})}$$

[Open Calculator !\[\]\(73002692dd5e7a64e60946be3158e719_img.jpg\)](#)

$$\text{ex } 125.6423\text{m}^3/\text{s} = 55 \cdot (2.5\text{km}^2)^{0.93 - \left(\frac{1}{14}\right) \cdot \log 10(2.5\text{km}^2)}$$

Ryve's Formula

14) Factors Dependent Constant from Ryve's Formula

$$\text{fx } C_R = \left(\frac{Q_r}{(A_{\text{km}})^{\frac{2}{3}}} \right)$$

[Open Calculator !\[\]\(aab88c0d099e5d18d6533a97b13ec28d_img.jpg\)](#)

$$\text{ex } 6.786044 = \left(\frac{125000\text{m}^3/\text{s}}{(2.5\text{km}^2)^{\frac{2}{3}}} \right)$$



Peak Drainage Discharge by Rational Formula

15) Catchment Area given Peak Rate of Runoff and Rainfall Intensity

$$\text{fx } A_c = \frac{36 \cdot Q_R}{C_r \cdot P_c}$$

[Open Calculator !\[\]\(83f22ed94ec5517769dd76d702c6bfd8_img.jpg\)](#)

$$\text{ex } 14.92539\text{ha} = \frac{36 \cdot 4166.67\text{m}^3/\text{s}}{0.5 \cdot 2.01\text{cm}/\text{h}}$$

16) Coefficient of Runoff given Peak Rate of Runoff

$$\text{fx } C_r = \frac{36 \cdot Q_R}{A_c \cdot P_c}$$

[Open Calculator !\[\]\(3cb60d42b10e53f9522bb0b392c1c4cd_img.jpg\)](#)

$$\text{ex } 0.497513 = \frac{36 \cdot 4166.67\text{m}^3/\text{s}}{15.0\text{ha} \cdot 2.01\text{cm}/\text{h}}$$

17) Critical Rainfall Intensity for Peak Rate of Runoff

$$\text{fx } P_c = \frac{36 \cdot Q_R}{A_c \cdot C_r}$$

[Open Calculator !\[\]\(0d7ca0919e6c47bbd874bfa0189fe22e_img.jpg\)](#)

$$\text{ex } 2.000002\text{cm}/\text{h} = \frac{36 \cdot 4166.67\text{m}^3/\text{s}}{15.0\text{ha} \cdot 0.5}$$



18) Peak Rate of Runoff in Rational Formula

[Open Calculator !\[\]\(3d8c13c92b853674f749aac6fa869926_img.jpg\)](#)

$$\text{fx } Q_R = \frac{C_r \cdot A_c \cdot P_c}{36}$$

$$\text{ex } 4187.5\text{m}^3/\text{s} = \frac{0.5 \cdot 15.0\text{ha} \cdot 2.01\text{cm/h}}{36}$$



Variables Used

- A_c Area of Catchment (Hectare)
- A_D Drainage Area (Hectare)
- A_{km} Catchment Area in KM (Square Kilometer)
- C_2 Coefficient
- C_r Runoff Coefficient
- C_R Ryve's Coefficient
- I_{BZ} Intensity of Rainfall in Burkli Zeigler (Centimeter per Hour)
- K' Runoff Coefficient for Burkli Zeigler
- L Length of Drain (Kilometer)
- P_c Critical Rainfall Intensity (Centimeter per Hour)
- Q_{BZ} Peak Rate of Runoff for Burkli Zeigler (Cubic Meter per Second)
- Q_d Peak Rate of Runoff from Dredge Formula (Cubic Meter per Second)
- Q_I Peak Rate of Runoff for Inglish (Cubic Meter per Second)
- Q_{NJB} Peak Rate of Runoff for Nawab Jung Bahadur (Cubic Meter per Second)
- Q_{PD} Peak Rate of Runoff from Dickens Formula (Cubic Meter per Second)
- Q_r Peak Rate of Runoff in ryves formula (Cubic Meter per Second)
- Q_R Peak Drainage Discharge by Rational Formula (Cubic Meter per Second)
- S_o Slope of the ground
- x Constant



Constants, Functions, Measurements used

- **Function:** **log10**, $\log_{10}(\text{Number})$

The common logarithm, also known as the base-10 logarithm or the decimal logarithm, is a mathematical function that is the inverse of the exponential function.

- **Function:** **sqrt**, $\text{sqrt}(\text{Number})$

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 Kilometer (km)

Length Unit Conversion 

- **Measurement:** **Area** in Hectare (ha), Square Kilometer (km^2)

Area Unit Conversion 

- **Measurement:** **Speed** in Centimeter per Hour (cm/h)

Speed Unit Conversion 

- **Measurement:** **Volumetric Flow Rate** in Cubic Meter per Second (m^3/s)

Volumetric Flow Rate Unit Conversion 



Check other formula lists

- [Channel Flow Time and Time of Concentration Formulas](#) 
- [Peak Drainage Discharge Formula Formulas](#) 
- [Rainfall Intensity Formulas](#) 

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