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Flow Over Rectangular Sharp-Crested Weir or Notch Formulas

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List of 41 Flow Over Rectangular Sharp-Crested Weir or Notch Formulas

Flow Over Rectangular Sharp-Crested Weir or Notch ⌕

1) Approach Velocity ⌕

Open Calculator ⌕

$$fx \quad v = \frac{Q'}{b \cdot d_f}$$

$$ex \quad 15.4494 \text{m/s} = \frac{153 \text{m}^3/\text{s}}{3.001 \text{m} \cdot 3.3 \text{m}}$$

2) Bazins Formula for Discharge if Velocity is considered ⌕

Open Calculator ⌕

$$fx \quad Q_{Bv} = m \cdot \sqrt{2 \cdot g} \cdot L_w \cdot H_{Stillwater}^{\frac{3}{2}}$$

$$ex \quad 91.65573 \text{m}^3/\text{s} = 0.407 \cdot \sqrt{2 \cdot 9.8 \text{m/s}^2} \cdot 3 \text{m} \cdot (6.6 \text{m})^{\frac{3}{2}}$$

3) Bazins Formula for Discharge if Velocity is not considered ⌕

Open Calculator ⌕

$$fx \quad Q_{Bv1} = m \cdot \sqrt{2 \cdot g} \cdot L_w \cdot S_w^{\frac{3}{2}}$$

$$ex \quad 15.28934 \text{m}^3/\text{s} = 0.407 \cdot \sqrt{2 \cdot 9.8 \text{m/s}^2} \cdot 3 \text{m} \cdot (2 \text{m})^{\frac{3}{2}}$$

4) Coefficient for Bazin Formula ⌕

Open Calculator ⌕

$$fx \quad m = 0.405 + \left(\frac{0.003}{S_w} \right)$$

$$ex \quad 0.4065 = 0.405 + \left(\frac{0.003}{2 \text{m}} \right)$$

5) Coefficient for Bazin Formula if Velocity is considered ⬀

fx $\quad m = 0.405 + \left(\dfrac{0.003}{H_{Stillwater}} \right)$

ex $\quad 0.405455 = 0.405 + \left(\dfrac{0.003}{6.6m} \right)$

6) Coefficient of Discharge given Discharge if Velocity considered ⬀

fx

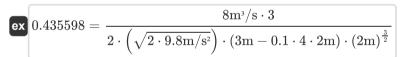$$C_d = \frac{Q_{Fr} \cdot 3}{2 \cdot \left(\sqrt{2 \cdot g} \right) \cdot (L_w - 0.1 \cdot n \cdot H_{Stillwater}) \cdot \left(H_{Stillwater}^{\frac{3}{2}} - H_V^{\frac{3}{2}} \right)}$$

ex $\quad 1.06198 = \dfrac{8m^3/s \cdot 3}{2 \cdot \left(\sqrt{2 \cdot 9.8m/s^2} \right) \cdot (3m - 0.1 \cdot 4 \cdot 6.6m) \cdot \left((6.6m)^{\frac{3}{2}} - (4.6m)^{\frac{3}{2}} \right)}$

7) Coefficient of Discharge given Discharge if Velocity not considered ⬀

fx $\quad C_d = \dfrac{Q_{Fr} \cdot 3}{2 \cdot \left(\sqrt{2 \cdot g} \right) \cdot (L_w - 0.1 \cdot n \cdot S_w) \cdot S_w^{\frac{3}{2}}}$

ex $\quad 0.435598 = \dfrac{8m^3/s \cdot 3}{2 \cdot \left(\sqrt{2 \cdot 9.8m/s^2} \right) \cdot (3m - 0.1 \cdot 4 \cdot 2m) \cdot (2m)^{\frac{3}{2}}}$

8) Coefficient of Discharge given Discharge over Weir without considering Velocity ⬀

fx $\quad C_d = \dfrac{Q_{Fr'} \cdot 3}{2 \cdot \left(\sqrt{2 \cdot g} \right) \cdot L_w \cdot S_w^{\frac{3}{2}}}$

ex $\quad 1.118034 = \dfrac{28m^3/s \cdot 3}{2 \cdot \left(\sqrt{2 \cdot 9.8m/s^2} \right) \cdot 3m \cdot (2m)^{\frac{3}{2}}}$

9) Coefficient of Discharge given Discharge Passing over Weir considering Velocity

Open Calculator

$$fx\ C_d = \frac{Q_{Fr'} \cdot 3}{2 \cdot \left(\sqrt{2 \cdot g} \right) \cdot L_w \cdot \left((S_w + H_V)^{\frac{3}{2}} - H_V^{\frac{3}{2}} \right)}$$

$$ex\ 0.446032 = \frac{28m^3/s \cdot 3}{2 \cdot \left(\sqrt{2 \cdot 9.8m/s^2} \right) \cdot 3m \cdot \left((2m + 4.6m)^{\frac{3}{2}} - (4.6m)^{\frac{3}{2}} \right)}$$

10) Coefficient when Bazin Formula for Discharge if Velocity is considered

Open Calculator

$$fx\ m = \frac{Q_{Bv}}{\sqrt{2 \cdot g} \cdot L_w \cdot H_{Stillwater}^{\frac{3}{2}}}$$

$$ex\ 0.406975 = \frac{91.65m^3/s}{\sqrt{2 \cdot 9.8m/s^2} \cdot 3m \cdot (6.6m)^{\frac{3}{2}}}$$
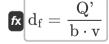
11) Coefficient when Bazin Formula for Discharge Velocity is not considered

Open Calculator

$$fx\ m = \frac{Q_{Bv1}}{\sqrt{2 \cdot g} \cdot L_w \cdot S_w^{\frac{3}{2}}}$$

$$ex\ 0.407284 = \frac{15.3m^3/s}{\sqrt{2 \cdot 9.8m/s^2} \cdot 3m \cdot (2m)^{\frac{3}{2}}}$$

12) Depth of Water Flow in Channel given Velocity Approach

Open Calculator

$$fx\ d_f = \frac{Q'}{b \cdot v}$$

$$ex\ 3.376358m = \frac{153m^3/s}{3.001m \cdot 15.1m/s}$$

13) Francis Formula for Discharge for Rectangular Notch if Velocity is considered ⌂

Open Calculator ⌂

fx
$$Q_{Fr} = 1.84 \cdot (L_w - 0.1 \cdot n \cdot H_{Stillwater}) \cdot \left(H_{Stillwater}^{\frac{3}{2}} - H_V^{\frac{3}{2}} \right)$$

ex
$$4.696288 \text{m}^3/\text{s} = 1.84 \cdot (3\text{m} - 0.1 \cdot 4 \cdot 6.6\text{m}) \cdot \left((6.6\text{m})^{\frac{3}{2}} - (4.6\text{m})^{\frac{3}{2}} \right)$$

14) Francis Formula for Discharge for Rectangular Notch if Velocity not considered ⌂

Open Calculator ⌂

fx
$$Q_{Fr} = 1.84 \cdot (L_w - 0.1 \cdot n \cdot S_w) \cdot S_w^{\frac{3}{2}}$$

ex
$$11.44947 \text{m}^3/\text{s} = 1.84 \cdot (3\text{m} - 0.1 \cdot 4 \cdot 2\text{m}) \cdot (2\text{m})^{\frac{3}{2}}$$

15) Rehbocks Formula for Coefficient of Discharge ⌂

Open Calculator ⌂

fx
$$C_d = 0.605 + 0.08 \cdot \left(\frac{S_w}{h_{Crest}} \right) + \left(\frac{0.001}{S_w} \right)$$

ex
$$0.618833 = 0.605 + 0.08 \cdot \left(\frac{2\text{m}}{12\text{m}} \right) + \left(\frac{0.001}{2\text{m}} \right)$$

16) Rehbocks Formula for Discharge over Rectangular Weir ⌂

Open Calculator ⌂

fx
$$Q_{Fr'} = \frac{2}{3} \cdot \left(0.605 + 0.08 \cdot \left(\frac{S_w}{h_{Crest}} \right) + \left(\frac{0.001}{S_w} \right) \right) \cdot \sqrt{2 \cdot g} \cdot L_w \cdot S_w^{\frac{3}{2}}$$

ex
$$15.49804 \text{m}^3/\text{s} = \frac{2}{3} \cdot \left(0.605 + 0.08 \cdot \left(\frac{2\text{m}}{12\text{m}} \right) + \left(\frac{0.001}{2\text{m}} \right) \right) \cdot \sqrt{2 \cdot 9.8 \text{m/s}^2} \cdot 3\text{m} \cdot (2\text{m})^{\frac{3}{2}}$$

17) Width of Channel given Velocity Approach ⌂

Open Calculator ⌂

fx
$$b = \frac{Q'}{v \cdot d_f}$$

ex
$$3.070439 \text{m} = \frac{153 \text{m}^3/\text{s}}{15.1 \text{m/s} \cdot 3.3\text{m}}$$

Discharge ⤤

18) Discharge considering Approach Velocity ⤤

fx

$$Q_{Fr} = \left(\frac{2}{3}\right) \cdot C_d \cdot \sqrt{2 \cdot g} \cdot (L_w - 0.1 \cdot n \cdot H_{Stillwater}) \cdot \left(H_{Stillwater}^{\frac{3}{2}} - H_V^{\frac{3}{2}}\right)$$

ex

$$4.971845 \text{m}^3/\text{s} = \left(\frac{2}{3}\right) \cdot 0.66 \cdot \sqrt{2 \cdot 9.8 \text{m/s}^2} \cdot (3\text{m} - 0.1 \cdot 4 \cdot 6.6\text{m}) \cdot \left((6.6\text{m})^{\frac{3}{2}} - (4.6\text{m})^{\frac{3}{2}}\right)$$

19) Discharge for Notch which is to be Calibrated ⤤

fx $Q_{Fr'} = k_{Flow} \cdot S_w^n$

ex $29.44 \text{m}^3/\text{s} = 1.84 \cdot (2\text{m})^4$

20) Discharge given Velocity Approach ⤤

fx $Q' = v \cdot (b \cdot d_f)$

ex $149.5398 \text{m}^3/\text{s} = 15.1 \text{m/s} \cdot (3.001\text{m} \cdot 3.3\text{m})$

21) Discharge over Weir without considering Velocity ⤤

fx $Q_{Fr'} = \left(\frac{2}{3}\right) \cdot C_d \cdot \sqrt{2 \cdot g} \cdot L_w \cdot S_w^{\frac{3}{2}}$

ex $16.52901 \text{m}^3/\text{s} = \left(\frac{2}{3}\right) \cdot 0.66 \cdot \sqrt{2 \cdot 9.8 \text{m/s}^2} \cdot 3\text{m} \cdot (2\text{m})^{\frac{3}{2}}$

22) Discharge Passing over Weir considering Velocity 🔗

fx $Q_{Fr'} = \left(\dfrac{2}{3}\right) \cdot C_d \cdot \sqrt{2 \cdot g} \cdot L_w \cdot \left((S_w + H_V)^{\frac{3}{2}} - H_V^{\frac{3}{2}}\right)$

ex $41.43204 \text{m}^3/\text{s} = \left(\dfrac{2}{3}\right) \cdot 0.66 \cdot \sqrt{2 \cdot 9.8\text{m/s}^2} \cdot 3\text{m} \cdot \left((2\text{m} + 4.6\text{m})^{\frac{3}{2}} - (4.6\text{m})^{\frac{3}{2}}\right)$

23) Discharge when End Contractions is suppressed and Velocity is considered 🔗

fx $Q_{Fr'} = 1.84 \cdot L_w \cdot \left(H_{Stillwater}^{\frac{3}{2}} - H_V^{\frac{3}{2}}\right)$

ex $39.13573 \text{m}^3/\text{s} = 1.84 \cdot 3\text{m} \cdot \left((6.6\text{m})^{\frac{3}{2}} - (4.6\text{m})^{\frac{3}{2}}\right)$

24) Discharge when End Contractions is suppressed and Velocity is not considered 🔗

fx $Q_{Fr'} = 1.84 \cdot L_w \cdot S_w^{\frac{3}{2}}$

ex $15.61292 \text{m}^3/\text{s} = 1.84 \cdot 3\text{m} \cdot (2\text{m})^{\frac{3}{2}}$

Hydraulic Head 🔗

25) Head given Coefficient for Bazin Formula 🔗

fx $S_w = \dfrac{0.003}{m - 0.405}$

ex $1.5\text{m} = \dfrac{0.003}{0.407 - 0.405}$

26) Head given Coefficient using Bazin Formula and Velocity 🔗

fx $H_{Stillwater} = \dfrac{0.003}{m - 0.405}$

ex $1.5\text{m} = \dfrac{0.003}{0.407 - 0.405}$

27) Head given Discharge through Notch which is to be Calibrated ⤤

fx $S_w = \left(\dfrac{Q_{Fr'}}{k_{Flow}} \right)^{\frac{1}{n}}$

ex $1.975082m = \left(\dfrac{28m^3/s}{1.84} \right)^{\frac{1}{4}}$

28) Head over Crest for given Discharge without Velocity ⤤

fx $S_w = \left(\dfrac{Q_{Fr'} \cdot 3}{2 \cdot C_d \cdot \sqrt{2 \cdot g} \cdot L_w} \right)^{\frac{2}{3}}$

ex $2.842087m = \left(\dfrac{28m^3/s \cdot 3}{2 \cdot 0.66 \cdot \sqrt{2 \cdot 9.8m/s^2} \cdot 3m} \right)^{\frac{2}{3}}$

29) Head over Crest given Discharge Passing over Weir with Velocity ⤤

fx $S_w = \left(\left(\dfrac{Q_{Fr'} \cdot 3}{2 \cdot C_d \cdot \sqrt{2 \cdot g} \cdot L_w} \right) + H_V^{\frac{3}{2}} \right)^{\frac{2}{3}} - H_V$

ex $1.389188m = \left(\left(\dfrac{28m^3/s \cdot 3}{2 \cdot 0.66 \cdot \sqrt{2 \cdot 9.8m/s^2} \cdot 3m} \right) + (4.6m)^{\frac{3}{2}} \right)^{\frac{2}{3}} - 4.6m$

30) Head when Bazin Formula for Discharge if Velocity is considered ⤤

fx $H_{Stillwater} = \left(\dfrac{Q_{Bv}}{m \cdot \sqrt{2 \cdot g} \cdot L_w} \right)^{\frac{2}{3}}$

ex $6.599725m = \left(\dfrac{91.65m^3/s}{0.407 \cdot \sqrt{2 \cdot 9.8m/s^2} \cdot 3m} \right)^{\frac{2}{3}}$

31) Head when Bazin Formula for Discharge if Velocity is not considered ⤤

$$fx \quad S_w = \left(\frac{Q_{Bv1}}{m \cdot \sqrt{2 \cdot g} \cdot L_w} \right)^{\frac{2}{3}}$$

$$ex \quad 2.00093m = \left(\frac{15.3m^3/s}{0.407 \cdot \sqrt{2 \cdot 9.8m/s^2} \cdot 3m} \right)^{\frac{2}{3}}$$

32) Head when End Contractions is suppressed ⤤

$$fx \quad H_{Stillwater} = \left(\frac{Q_{Fr'}}{1.84 \cdot L_w} \right)^{\frac{2}{3}}$$
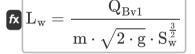
$$ex \quad 2.952201m = \left(\frac{28m^3/s}{1.84 \cdot 3m} \right)^{\frac{2}{3}}$$

Length of Crest ⤤

33) Length given Bazins Formula for Discharge if Velocity is not considered ⤤

$$fx \quad L_w = \frac{Q_{Bv1}}{m \cdot \sqrt{2 \cdot g} \cdot S_w^{\frac{3}{2}}}$$

$$ex \quad 3.002092m = \frac{15.3m^3/s}{0.407 \cdot \sqrt{2 \cdot 9.8m/s^2} \cdot (2m)^{\frac{3}{2}}}$$

34) Length of Crest considering Velocity 🔗

fx
Open Calculator 🔗

$$L_w = \left(\frac{3 \cdot Q_{Fr'}}{2 \cdot C_d \cdot \sqrt{2 \cdot g} \cdot \left(H_{Stillwater}^{\frac{3}{2}} - H_V^{\frac{3}{2}} \right)} \right) + (0.1 \cdot n \cdot H_{Stillwater})$$

ex $4.667416m = \left(\frac{3 \cdot 28m^3/s}{2 \cdot 0.66 \cdot \sqrt{2 \cdot 9.8m/s^2} \cdot \left((6.6m)^{\frac{3}{2}} - (4.6m)^{\frac{3}{2}} \right)} \right) + (0.1 \cdot 4 \cdot 6.6m)$

35) Length of Crest given Discharge Passing over Weir 🔗

fx $L_w = \dfrac{Q_{Fr'} \cdot 3}{2 \cdot C_d \cdot \sqrt{2 \cdot g} \cdot \left((S_w + H_V)^{\frac{3}{2}} - H_V^{\frac{3}{2}} \right)}$
Open Calculator 🔗

ex $2.027416m = \dfrac{28m^3/s \cdot 3}{2 \cdot 0.66 \cdot \sqrt{2 \cdot 9.8m/s^2} \cdot \left((2m + 4.6m)^{\frac{3}{2}} - (4.6m)^{\frac{3}{2}} \right)}$

36) Length of Crest when Discharge and Velocity is considered 🔗

fx $L_w = \dfrac{Q_{Fr'}}{1.84 \cdot \left(H_{Stillwater}^{\frac{3}{2}} - H_V^{\frac{3}{2}} \right)}$
Open Calculator 🔗

ex $2.146376m = \dfrac{28m^3/s}{1.84 \cdot \left((6.6m)^{\frac{3}{2}} - (4.6m)^{\frac{3}{2}} \right)}$

37) Length of Crest when Discharge and Velocity is not considered 🔗

fx $L_w = \dfrac{Q_{Fr'}}{1.84 \cdot H_{Stillwater}^{\frac{3}{2}}}$
Open Calculator 🔗

ex $0.897479m = \dfrac{28m^3/s}{1.84 \cdot (6.6m)^{\frac{3}{2}}}$

38) Length of Crest when Francis Formula Discharge and Velocity is considered 🔗

fx $$L_w = \left(\frac{Q_{Fr}}{1.84 \cdot \left(H_{Stillwater}^{\frac{3}{2}} - H_V^{\frac{3}{2}} \right)} \right) + (0.1 \cdot n \cdot H_{Stillwater})$$

ex $$3.25325m = \left(\frac{8m^3/s}{1.84 \cdot \left((6.6m)^{\frac{3}{2}} - (4.6m)^{\frac{3}{2}} \right)} \right) + (0.1 \cdot 4 \cdot 6.6m)$$

39) Length of Crest when Francis Formula Discharge and Velocity is not considered 🔗

fx $$L_w = \left(\frac{Q_{Fr}}{1.84 \cdot S_w^{\frac{3}{2}}} \right) + (0.1 \cdot n \cdot S_w)$$

ex $$2.337189m = \left(\frac{8m^3/s}{1.84 \cdot (2m)^{\frac{3}{2}}} \right) + (0.1 \cdot 4 \cdot 2m)$$

40) Length of Crest without considering Velocity 🔗

fx $$L_w = \left(\frac{Q_{Fr} \cdot 2}{3 \cdot C_d \cdot \sqrt{2 \cdot g}} \right)^{\frac{2}{3}} + (0.1 \cdot n \cdot S_w)$$

ex $$2.293543m = \left(\frac{8m^3/s \cdot 2}{3 \cdot 0.66 \cdot \sqrt{2 \cdot 9.8m/s^2}} \right)^{\frac{2}{3}} + (0.1 \cdot 4 \cdot 2m)$$

41) Length when Bazins formula for Discharge if Velocity is considered 🔗

fx $$L_w = \frac{Q_{Bv}}{m \cdot \sqrt{2 \cdot g} \cdot H_{Stillwater}^{\frac{3}{2}}}$$

ex $$2.999813m = \frac{91.65m^3/s}{0.407 \cdot \sqrt{2 \cdot 9.8m/s^2} \cdot (6.6m)^{\frac{3}{2}}}$$

Variables Used

- **b** Width of Channel1 *(Meter)*
- **C_d** Coefficient of Discharge
- **d_f** Depth of Flow *(Meter)*
- **g** Acceleration due to Gravity *(Meter per Square Second)*
- **h_{Crest}** Height of Crest *(Meter)*
- **$H_{Stillwater}$** Still Water Head *(Meter)*
- **H_V** Velocity Head *(Meter)*
- **k_{Flow}** Constant of Flow
- **L_w** Length of Weir Crest *(Meter)*
- **m** Bazins Coefficient
- **n** Number of End Contraction
- **Q'** Discharge by Approach Velocity *(Cubic Meter per Second)*
- **Q_{Bv}** Bazins Discharge with Velocity *(Cubic Meter per Second)*
- **Q_{Bv1}** Bazins Discharge without Velocity *(Cubic Meter per Second)*
- **Q_{Fr}** Francis Discharge *(Cubic Meter per Second)*
- **$Q_{Fr'}$** Francis Discharge with Suppressed End *(Cubic Meter per Second)*
- **S_w** Height of Water above Crest of Weir *(Meter)*
- **v** Velocity of Flow 1 *(Meter per Second)*

Constants, Functions, Measurements used

- Function: **sqrt**, sqrt(Number)
  Square root function
- Measurement: **Length** in Meter (m)
  Length Unit Conversion ⬀
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion ⬀
- Measurement: **Acceleration** in Meter per Square Second (m/s²)
  Acceleration Unit Conversion ⬀
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m³/s)
  Volumetric Flow Rate Unit Conversion ⬀

Check other formula lists

- **Broad Crested Weir Formulas** ⬀

- **Flow Over Rectangular Sharp-Crested Weir or Notch Formulas** ⬀

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