



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

 $\left| \mathbf{x} \right| v = rac{Q'}{b \cdot d_f}$

Open Calculator

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

2) Bazins Formula for Discharge if Velocity is considered

 $Q_{\mathrm{Bv}} = m \cdot \sqrt{2 \cdot g} \cdot L_{\mathrm{w}} \cdot H_{\mathrm{Stillwater}}^{rac{3}{2}}$

Open Calculator

3) Bazins Formula for Discharge if Velocity is not considered

 $\left[\mathbf{Q}_{\mathrm{Bv1}} = \mathbf{m} \cdot \sqrt{2 \cdot \mathbf{g}} \cdot \mathbf{L}_{\mathrm{w}} \cdot \mathbf{S}_{\mathrm{w}}^{rac{3}{2}}
ight]$

Open Calculator 🚰

= 15.28934m³/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 🛂

 $m=0.405+\left(rac{0.003}{
m S_w}
ight)$

Open Calculator

 $oxed{ex} \left[0.4065 = 0.405 + \left(rac{0.003}{2 \mathrm{m}}
ight)
ight]$





5) Coefficient for Bazin Formula if Velocity is considered 🗗

 $m m = 0.405 + \left(rac{0.003}{H_{Stillwater}}
ight)$

Open Calculator 🚰

Open Calculator

$$\boxed{ 0.405455 = 0.405 + \left(\frac{0.003}{6.6 \mathrm{m}} \right) }$$

6) Coefficient of Discharge given Discharge if Velocity considered

fx

$$\mathrm{C_d} = rac{\mathrm{Q_{Fr} \cdot 3}}{2 \cdot \left(\sqrt{2 \cdot \mathrm{g}}
ight) \cdot \left(\mathrm{L_w} - 0.1 \cdot \mathrm{n} \cdot \mathrm{H_{Stillwater}}
ight) \cdot \left(\mathrm{H_{Stillwater}^{rac{3}{2}} - H_{\mathrm{V}}^{rac{3}{2}}}
ight)}$$

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

7) Coefficient of Discharge given Discharge if Velocity not considered

 $\mathbf{K} \mathbf{C}_{\mathrm{d}} = rac{\mathbf{Q}_{\mathrm{Fr}} \cdot \mathbf{3}}{2 \cdot \left(\sqrt{2 \cdot \mathrm{g}}
ight) \cdot \left(\mathbf{L}_{\mathrm{w}} - 0.1 \cdot \mathbf{n} \cdot \mathbf{S}_{\mathrm{w}}
ight) \cdot \mathbf{S}_{\mathrm{w}}^{rac{3}{2}}}$

Open Calculator

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

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





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

 $\mathbf{C}_{\mathrm{d}} = rac{\mathrm{Q}_{\mathrm{Fr},\cdot}\cdot 3}{2\cdot\left(\sqrt{2\cdot\mathrm{g}}
ight)\cdot\mathrm{L}_{\mathrm{w}}\cdot\left(\left(\mathrm{S}_{\mathrm{w}}+\mathrm{H}_{\mathrm{V}}
ight)^{rac{3}{2}}-\mathrm{H}_{\mathrm{V}}^{rac{3}{2}}
ight)}$

Open Calculator 🗗

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

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

Open Calculator

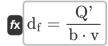
$$\boxed{0.406975 = \frac{91.65 \text{m}^3/\text{s}}{\sqrt{2 \cdot 9.8 \text{m/s}^2} \cdot 3 \text{m} \cdot (6.6 \text{m})^{\frac{3}{2}}}}$$

11) Coefficient when Bazin Formula for Discharge Velocity is not considered

 $m = rac{\mathrm{Q}_{\mathrm{Bv1}}}{\sqrt{2 \cdot \mathrm{g}} \cdot \mathrm{L}_{\mathrm{w}} \cdot \mathrm{S}_{\mathrm{w}}^{rac{3}{2}}}$

Open Calculator

12) Depth of Water Flow in Channel given Velocity Approach



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



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

Open Calculator $\left| \mathbf{R} \right| \mathrm{Q_{Fr}} = 1.84 \cdot \left(\mathrm{L_w} - 0.1 \cdot \mathrm{n} \cdot \mathrm{H_{Stillwater}}
ight) \cdot \left(\mathrm{H_{Stillwater}^{rac{3}{2}} - H_{V}^{rac{3}{2}}}
ight)$

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

Open Calculator

 $\left[\mathbf{R}
ight]\mathrm{Q_{Fr}}=1.84\cdot\left(\mathrm{L_{w}}-0.1\cdot\mathrm{n}\cdot\mathrm{S_{w}}
ight)\cdot\mathrm{S_{w}^{rac{2}{2}}}$

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

15) Rehbocks Formula for Coefficient of Discharge

 $\mathbf{C}_{
m d} = 0.605 + 0.08 \cdot \left(rac{
m S_w}{
m h_{Creat}}
ight) + \left(rac{0.001}{
m S_{rr}}
ight)$

Open Calculator

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

16) Rehbocks Formula for Discharge over Rectangular Weir

Open Calculator 2

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

ex

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

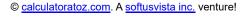
17) Width of Channel given Velocity Approach

 $b = \frac{Q'}{V \cdot dc}$

$$b = \frac{1}{v \cdot d_f}$$

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





Discharge 2

18) Discharge considering Approach Velocity

To, Diodiai go concidening Approach voicetty

Open Calculator

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

ex

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

19) Discharge for Notch which is to be Calibrated

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

Open Calculator 🗗

$$\mathbf{ex} \left[29.44 \mathrm{m}^3 / \mathrm{s} = 1.84 \cdot \left(2 \mathrm{m} \right)^4 \right]$$

20) Discharge given Velocity Approach 🗗

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

Open Calculator

$$\mathbf{ex} \left[149.5398 \mathrm{m}^{_{3}}/\mathrm{s} = 15.1 \mathrm{m/s} \cdot (3.001 \mathrm{m} \cdot 3.3 \mathrm{m}) \right]$$

21) Discharge over Weir without considering Velocity 🗗

$$\mathbf{R} \mathbf{Q}_{\mathrm{Fr'}} = \left(rac{2}{3}
ight) \cdot \mathrm{C_d} \cdot \sqrt{2 \cdot \mathrm{g}} \cdot \mathrm{L_w} \cdot \mathrm{S_w^{rac{3}{2}}}$$

$$ext{ex} 16.52901 ext{m}^3/ ext{s} = \left(rac{2}{3}
ight) \cdot 0.66 \cdot \sqrt{2 \cdot 9.8 ext{m/s}^2} \cdot 3 ext{m} \cdot (2 ext{m})^{rac{3}{2}}$$



22) Discharge Passing over Weir considering Velocity

 $\mathbf{Q}_{\mathrm{Fr}^{\prime}} = \left(rac{2}{3}
ight) \cdot \mathrm{C_d} \cdot \sqrt{2 \cdot \mathrm{g}} \cdot \mathrm{L_w} \cdot \left(\left(\mathrm{S_w} + \mathrm{H_V}
ight)^{rac{3}{2}} - \mathrm{H_V^{rac{3}{2}}}
ight)$

Open Calculator

Open Calculator

Open Calculator 2

Open Calculator

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

$$Q_{\mathrm{Fr'}} = 1.84 \cdot L_{\mathrm{w}} \cdot \left(H_{\mathrm{Stillwater}}^{rac{3}{2}} - H_{\mathrm{V}}^{rac{3}{2}}
ight)$$
 Open Calculator $oldsymbol{C}$

$$\mathbf{ex} \left[39.13573 \mathrm{m}^3/\mathrm{s} = 1.84 \cdot 3 \mathrm{m} \cdot \left((6.6 \mathrm{m})^{rac{3}{2}} - (4.6 \mathrm{m})^{rac{3}{2}}
ight)
ight]$$

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

$$\mathbf{R} \mathbf{Q}_{\mathrm{Fr'}} = 1.84 \cdot \mathbf{L}_{\mathrm{w}} \cdot \mathbf{S}_{\mathrm{w}}^{rac{3}{2}}$$

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

Hydraulic Head 🗗

25) Head given Coefficient for Bazin Formula 💪

$${f K} \, {
m S}_{
m w} = rac{0.003}{{
m m} - 0.405}$$

$$\boxed{1.5\text{m} = \frac{0.003}{0.407 - 0.405}}$$

26) Head given Coefficient using Bazin Formula and Velocity 🗗

fx
$$m H_{Stillwater} = rac{0.003}{m-0.405}$$

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





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

 $\mathbf{K} \mathbf{S}_{\mathrm{w}} = \left(rac{\mathbf{Q}_{\mathrm{Fr'}}}{\mathbf{k}_{\mathrm{Elow}}}
ight)^{rac{1}{\mathrm{n}}}$

Open Calculator 🚰

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

28) Head over Crest for given Discharge without Velocity

 $\mathbf{S}_{\mathrm{w}} = \left(rac{\mathrm{Q}_{\mathrm{Fr}}\cdot 3}{2\cdot \mathrm{C}_{\mathrm{d}}\cdot \sqrt{2\cdot \mathrm{g}}\cdot \mathrm{L}_{\mathrm{w}}}
ight)^{rac{2}{3}}$

Open Calculator

 $oxed{ex} 2.842087 \mathrm{m} = \left(rac{28 \mathrm{m}^3/\mathrm{s} \cdot 3}{2 \cdot 0.66 \cdot \sqrt{2 \cdot 9.8 \mathrm{m/s}^2} \cdot 3 \mathrm{m}}
ight)^{rac{2}{3}}$

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

 $\mathbf{S}_{\mathrm{w}} = \left(\left(rac{\mathrm{Q}_{\mathrm{Fr}}, \cdot 3}{2 \cdot \mathrm{C}_{\mathrm{d}} \cdot \sqrt{2 \cdot \mathrm{g}} \cdot \mathrm{L}_{\mathrm{w}}}
ight) + \mathrm{H}_{\mathrm{V}}^{rac{3}{2}}
ight)^{rac{2}{3}} - \mathrm{H}_{\mathrm{V}}$

Open Calculator

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

 $\mathbf{f}_{ ext{Normalize}}\mathbf{H}_{ ext{Stillwater}} = \left(rac{Q_{Bv}}{\mathbf{m}\cdot\sqrt{2\cdot\mathbf{g}}\cdot\mathrm{L_w}}
ight)^{rac{2}{3}}$

Open Calculator

 $oxed{ex} 6.599725 \mathrm{m} = \left(rac{91.65 \mathrm{m}^3/\mathrm{s}}{0.407 \cdot \sqrt{2 \cdot 9.8 \mathrm{m/s^2} \cdot 3 \mathrm{m}}}
ight)^{rac{2}{3}}$





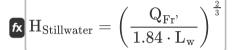
31) Head when Bazin Formula for Discharge if Velocity is not considered

 $\mathbf{S}_{\mathrm{w}} = \left(rac{Q_{\mathrm{Bv1}}}{\mathrm{m}\cdot\sqrt{2\cdot\mathrm{g}}\cdot\mathrm{L}_{\mathrm{w}}}
ight)^{rac{2}{3}}$

Open Calculator 🚰

 $oxed{ex} 2.00093 \mathrm{m} = \left(rac{15.3 \mathrm{m}^3/\mathrm{s}}{0.407 \cdot \sqrt{2 \cdot 9.8 \mathrm{m/s^2}} \cdot 3 \mathrm{m}}
ight)^{rac{2}{3}}$

32) Head when End Contractions is suppressed

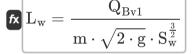


Open Calculator

ex $2.952201 \mathrm{m} = \left(\frac{28 \mathrm{m}^3/\mathrm{s}}{1.84 \cdot 3 \mathrm{m}}\right)^{\frac{2}{3}}$

Length of Crest

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



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



34) Length of Crest considering Velocity

fx Open Calculator

$$oxed{ egin{aligned} \mathbf{L}_{\mathrm{w}} = \left(rac{3 \cdot \mathbf{Q}_{\mathrm{Fr}^{,}}}{2 \cdot \mathbf{C}_{\mathrm{d}} \cdot \sqrt{2 \cdot \mathbf{g}} \cdot \left(\mathbf{H}_{\mathrm{Stillwater}}^{rac{3}{2}} - \mathbf{H}_{\mathrm{V}}^{rac{3}{2}}
ight)}
ight) + (0.1 \cdot \mathbf{n} \cdot \mathbf{H}_{\mathrm{Stillwater}}) \end{aligned}}$$

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

35) Length of Crest given Discharge Passing over Weir

 $\mathbf{E} \mathbf{L}_{\mathrm{w}} = rac{\mathbf{Q}_{\mathrm{Fr}} \cdot \mathbf{3}}{2 \cdot \mathbf{C}_{\mathrm{d}} \cdot \sqrt{2 \cdot \mathbf{g}} \cdot \left(\left(\mathbf{S}_{\mathrm{w}} + \mathbf{H}_{\mathrm{V}}
ight)^{rac{3}{2}} - \mathbf{H}_{\mathrm{V}}^{rac{3}{2}}
ight)}$

Open Calculator

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

36) Length of Crest when Discharge and Velocity is considered

 $\mathbf{K} egin{align*} \mathbf{L}_{\mathrm{w}} &= rac{\mathbf{Q}_{\mathrm{Fr}},}{1.84 \cdot \left(\mathbf{H}_{\mathrm{Stillweter}}^{rac{3}{2}} - \mathbf{H}_{\mathrm{V}}^{rac{3}{2}}
ight)}, \end{split}$

Open Calculator

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

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

 $\mathrm{L_w} = rac{\mathrm{Q_{Fr'}}}{1.84 \cdot \mathrm{H_{Stillwater}^{rac{3}{2}}}}$

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







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

 $\mathbf{L}_{\mathrm{w}} = \left(rac{\mathrm{Q}_{\mathrm{Fr}}}{1.84 \cdot \left(\mathrm{H}_{\mathrm{Stillwater}}^{rac{3}{2}} - \mathrm{H}_{\mathrm{V}}^{rac{3}{2}}
ight)}
ight) + \left(0.1 \cdot \mathrm{n} \cdot \mathrm{H}_{\mathrm{Stillwater}}
ight)$

Open Calculator 🚰

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

 $\mathbf{L}_{\mathrm{w}} = \left(rac{\mathrm{Q}_{\mathrm{Fr}}}{1.84\cdot\mathrm{S}_{\mathrm{w}}^{rac{3}{2}}}
ight) + \left(0.1\cdot\mathrm{n}\cdot\mathrm{S}_{\mathrm{w}}
ight)$

Open Calculator

 $oxed{ex} 2.337189 \mathrm{m} = \left(rac{8 \mathrm{m}^3 / \mathrm{s}}{1.84 \cdot (2 \mathrm{m})^{rac{3}{2}}}
ight) + (0.1 \cdot 4 \cdot 2 \mathrm{m})$

40) Length of Crest without considering Velocity

 $\mathbf{E} \mathbf{L}_{\mathrm{w}} = \left(rac{\mathrm{Q}_{\mathrm{Fr}} \cdot 2}{3 \cdot \mathrm{C}_{\mathrm{d}} \cdot \sqrt{2 \cdot \mathrm{g}}}
ight)^{rac{2}{3}} + (0.1 \cdot \mathrm{n} \cdot \mathrm{S}_{\mathrm{w}})$

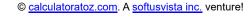
Open Calculator 🗗

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

 $L_{w} = rac{Q_{Bv}}{m \cdot \sqrt{2 \cdot g} \cdot H_{Q_{t;ill_{wind to w}}}^{rac{3}{2}}}$

Open Calculator







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)
- HStillwater Still Water Head (Meter)
- **H**_V Velocity Head (Meter)
- k_{Flow} Constant of Flow
- Lw 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)
- QFr Francis Discharge (Cubic Meter per Second)
- QFr 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)

 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: 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 a Trapizoidal and Triangular Weir or Notch Formulas
- Flow Over Rectangular Sharp Crested Weir or Notch Formulas
- Submerged Weirs Formulas
- Time Required to Empty a Reservoir with Rectangular Weir Formulas

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