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Flow Over Rectangular Sharp Crested Weir or Notch Formulas

Calculators! Examples! Conversions!

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

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

Open Calculator

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

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

3) Bazins Formula for Discharge if Velocity is not considered

Open Calculator

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

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

4) Coefficient for Bazin Formula

Open Calculator

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

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

5) Coefficient for Bazin Formula if Velocity is considered

Open Calculator

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

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

6) Coefficient of Discharge given Discharge if Velocity considered

Open Calculator

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

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

7) Coefficient of Discharge given Discharge if Velocity not considered

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

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

12) Depth of Water Flow in Channel given Velocity Approach

Open Calculator

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

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

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

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

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

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

17) Width of Channel given Velocity Approach

Open Calculator

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

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

Discharge

18) Discharge considering Approach Velocity

Open Calculator

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

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

19) Discharge for Notch which is to be Calibrated

Open Calculator

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

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

20) Discharge given Velocity Approach

Open Calculator

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

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

21) Discharge over Weir without considering Velocity

Open Calculator

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

22) Discharge Passing over Weir considering Velocity

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

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

Hydraulic Head

25) Head given Coefficient for Bazin Formula

Open Calculator

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

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

26) Head given Coefficient using Bazin Formula and Velocity

Open Calculator

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

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

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

Open Calculator

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

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

28) Head over Crest for given Discharge without Velocity

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

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

32) Head when End Contractions is suppressed

Open Calculator

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

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

Length of Crest

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

Open Calculator

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

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

34) Length of Crest considering Velocity

Open Calculator

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

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

35) Length of Crest given Discharge Passing over Weir

Open Calculator

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

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

36) Length of Crest when Discharge and Velocity is considered

Open Calculator

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

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

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

Open Calculator

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

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

Open Calculator

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

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

Open Calculator

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

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

40) Length of Crest without considering Velocity

Open Calculator

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

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

Open Calculator

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

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

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)
  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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