



Most Efficient Section of Channel Formulas

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List of 38 Most Efficient Section of Channel Formulas

Most Efficient Section of Channel

Circular Section G

1) Chezy Constant given Discharge through Channels

$$\mathrm{C} = rac{\mathrm{Q}}{\sqrt{\left(\mathrm{A}^3
ight)\cdot rac{\mathrm{S}}{\mathrm{p}}}}$$

Open Calculator

ex
$$22.4 = rac{14 ext{m}^3/ ext{s}}{\sqrt{\left(\left(25 ext{m}^2\right)^3\right) \cdot rac{0.0004}{16 ext{m}}}}$$

2) Depth of Flow in most Efficient Channel for Maximum Discharge 🗗

fx
$$D_{\mathrm{f}} = 1.876 \cdot \mathrm{r'}$$

Open Calculator 🗗

$$\mathbf{ex} \ 5.628 \mathrm{m} = 1.876 \cdot 3 \mathrm{m}$$

3) Depth of Flow in most Efficient Channel for Maximum Velocity

$$extbf{D}_{ ext{f}} = 1.626 \cdot ext{r'}$$

Open Calculator

$$4.878m = 1.626 \cdot 3m$$





4) Depth of flow in most Efficient Channel in circular channel

fx $D_{
m f}=1.8988\cdot {
m r}'$

Open Calculator 🖸

 $|\mathbf{ex}| 5.6964 \mathrm{m} = 1.8988 \cdot 3 \mathrm{m}$

5) Diameter of Section given Depth of Flow in most Efficient channel for Maximum Velocity

 $\boxed{\textbf{fx}} d_{section} = \frac{D_f}{0.81}$

Open Calculator

 $= 6.419753 \text{m} = \frac{5.2 \text{m}}{0.81}$

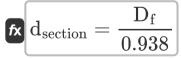
6) Diameter of Section given Depth of flow in most Efficient Channel section

 $ag{d}_{
m section} = rac{{
m D_f}}{0.95}$

Open Calculator

 $= \frac{5.2 \text{m}}{0.95}$

7) Diameter of Section given Flow Depth in most Efficient Channel



Open Calculator





8) Diameter of Section given Hydraulic Radius in most Efficient Channel for Maximum Velocity

fx $d_{
m section} = rac{R_{
m H}}{0.3}$

Open Calculator

 $= \frac{1.6 \text{m}}{0.3}$

9) Diameter of Section when Hydraulic Radius is at 0.9D

fx $m d_{section} = rac{R_{H}}{0.29}$

Open Calculator

 $= \frac{1.6 \text{m}}{0.29}$

10) Discharge through Channels

 $\left|\mathbf{Q}=\mathrm{C}\cdot\sqrt{\left(\mathrm{A}^{3}
ight)\cdotrac{\mathrm{S}}{\mathrm{p}}}
ight|$

Open Calculator

 $ext{ex} 25 ext{m}^3/ ext{s} = 40 \cdot \sqrt{\left((25 ext{m}^2)^3
ight) \cdot rac{0.0004}{16 ext{m}}}$

11) Hydraulic Radius in most Efficient channel for Maximum Velocity

fx $m R_H = 0.6806 \cdot r'$

Open Calculator

 $\mathbf{ex} \ 2.0418 \mathrm{m} = 0.6806 \cdot 3 \mathrm{m}$







12) Radius of Section given Depth of flow in Efficient Channel

fx $m r'=rac{D_f}{1.8988}$

Open Calculator

 $2.738572m = \frac{5.2m}{1.8988}$

13) Radius of Section given Depth of Flow in most Efficient Channel for Maximum Velocity

 $\mathbf{f}\mathbf{x}\mathbf{r}'=rac{\mathrm{D_f}}{1.626}$

Open Calculator 🖸

14) Radius of Section given Depth of Flows in most Efficient Channel

fx ${
m r'}=rac{{
m D_f}}{1.876}$

Open Calculator ☑

15) Radius of Section given Hydraulic Radius

 $\mathbf{f}\mathbf{x}$ $\mathbf{r}'=rac{\mathrm{R_{H}}}{0.5733}$

1.6m





Open Calculator

16) Radius of Section given Hydraulic Radius in most Efficient Channel for Maximum Velocity

$$\mathbf{r'} = rac{\mathrm{R_H}}{0.6806}$$

Open Calculator 2

 $2.350867m = \frac{1.6m}{0.6806}$

17) Side Slope of Channel Bed given Discharge through Channels 🗗

$$=rac{\mathrm{p}}{rac{\left(\mathrm{A}^{3}
ight)}{\left(rac{\mathrm{Q}}{\mathrm{C}}
ight)^{2}}}$$

Open Calculator 2

ex $0.000125 = \frac{16\text{m}}{\frac{\left((25\text{m}^2)^3\right)}{(14\text{m}/N)^2}}$

18) Wetted Area given Discharge through Channels



$$\mathbf{A} = \left(\left(\left(\frac{\mathrm{Q}}{\mathrm{C}} \right)^2 \right) \cdot \frac{\mathrm{p}}{\mathrm{S}} \right)^{\frac{1}{3}}$$

Open Calculator G

ex
$$16.98499 \mathrm{m}^2 = \left(\left(\left(\frac{14 \mathrm{m}^3/\mathrm{s}}{40} \right)^2 \right) \cdot \frac{16 \mathrm{m}}{0.0004} \right)^{\frac{1}{3}}$$





19) Wetted Perimeter given Discharge through Channels

 $\mathbf{f} \mathbf{x} = \frac{\left(\mathrm{A}^3\right) \cdot \mathrm{S}}{\left(\frac{\mathrm{Q}}{\mathrm{C}}\right)^2}$

Open Calculator

 $extbf{ex} 51.02041 ext{m} = rac{\left(\left(25 ext{m}^2
ight)^3
ight) \cdot 0.0004}{\left(rac{14 ext{m}^3/ ext{s}}{40}
ight)^2}$

Rectangular Section 2

20) Depth of Flow given Hydraulic Radius in most Efficient Rectangular Channel

fx $\mathrm{D_f} = \mathrm{R_{H(rect)}} \cdot 2$

Open Calculator 🗗

 $\texttt{ex} \ 5.2 \text{m} = 2.6 \text{m} \cdot 2$

21) Depth of Flow in Most Efficient Channel for Rectangular Channel

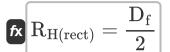
 $D_{
m f} = rac{{
m B}_{
m rect}}{2}$

Open Calculator 🗗

 $= \frac{10.4 \text{m}}{2}$



22) Hydraulic Radius in most Efficient Open Channel



Open Calculator

 $\boxed{2.6\mathrm{m} = \frac{5.2\mathrm{m}}{2}}$

23) Width of Channel given Depth of flow in Most Efficient channels

fx $B_{
m rect} = D_{
m f} \cdot 2$

Open Calculator

 $\boxed{\textbf{ex}} \ 10.4 \text{m} = 5.2 \text{m} \cdot 2$

Trapezoidal Section

24) Depth of Flow given Hydraulic Radius in Most Efficient Trapezoidal Channel

fx $m [d_f = R_H \cdot 2]$

Open Calculator

 $\boxed{3.2\mathrm{m} = 1.6\mathrm{m} \cdot 2}$

25) Depth of Flow given Wetted Area in Most Efficient Channel for Bottom Width is kept Constant

fx $d_{\mathrm{f}} = (z_{\mathrm{trap}} \cdot S_{\mathrm{Trap}})^{rac{1}{2}}$

Open Calculator





26) Depth of Flow in most Efficient Channel in Trapezoidal Channel 🖸

 \mathbf{f} $\mathrm{d}_{\mathrm{f}} = rac{\mathrm{B}_{\mathrm{trap}}}{rac{2}{\sqrt{2}}}$

Open Calculator 🗗

$$= 3.29999 m = \frac{3.8105 m}{\frac{2}{\sqrt{3}}}$$

27) Depth of Flow in most Efficient Channel in Trapezoidal Channel given Channel Slope

fx $d_{
m f} = rac{{
m B}_{
m trap} \cdot 0.5}{\sqrt{\left({
m z}_{
m trap}^2
ight) + 1} - {
m z}_{
m trap}}$

Open Calculator

ex
$$3.298989m = \frac{3.8105m \cdot 0.5}{\sqrt{\left((0.577)^2\right) + 1} - 0.577}$$

28) Depth of Flow when Width of Channel in Most Efficient Channel for Bottom Width is kept Constant

 $\mathbf{\hat{z}} = \mathbf{B}_{\mathrm{trap}} \cdot rac{\mathbf{z}_{\mathrm{trap}}}{1 - \left(\mathbf{z}_{\mathrm{trap}}^2
ight)}$

Open Calculator

ex
$$3.295989 \text{m} = 3.8105 \text{m} \cdot \frac{0.577}{1 - \left((0.577)^2 \right)}$$





29) Hydraulic Radius of Most Efficient Channel

 $\left| {
m R}_{
m H} = rac{d_{
m f}}{2}
ight|$

Open Calculator

 $\boxed{1.65\mathrm{m} = \frac{3.3\mathrm{m}}{2}}$

30) Side Slope of Section for Depth of Flow is kept Constant

 $\mathbf{z}_{ ext{trap}} = rac{1}{\sqrt{3}} \cdot rac{\mathrm{d_f}}{\mathrm{d_f}}$

Open Calculator

 $= 2.57735 = \frac{1}{\sqrt{3}} \cdot \frac{3.3 \text{m}}{3.3 \text{m}}$

31) Side Slope of Section given Wetted Area for Bottom Width is kept Constant

 $\mathbf{z}_{ ext{trap}} = d_{ ext{f}} \cdot rac{d_{ ext{f}}}{S_{ ext{Trap}}}$

Open Calculator

 $= 0.577413 = 3.3 \text{m} \cdot \frac{3.3 \text{m}}{18.86 \text{m}^2}$



32) Wetted Area in Most Efficient Channel for Bottom Width is kept Constant

$$\left| \mathbf{f}_{\mathbf{z}} \mathbf{S}_{\mathrm{Trap}} = \mathrm{d}_{\mathrm{f}} \cdot rac{\mathrm{d}_{\mathrm{f}}}{\mathrm{z}_{\mathrm{trap}}}
ight|$$

Open Calculator 🗗

$$= 18.87348 \mathrm{m}^{_{2}} = 3.3 \mathrm{m} \cdot \frac{3.3 \mathrm{m}}{0.577}$$

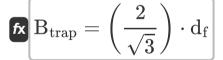
33) Width of Channel given Depth of Flow in Efficient Channel

fx

$$ext{B}_{ ext{trap}} = \left(\sqrt{\left(ext{z}_{ ext{trap}}^2
ight) + 1}
ight) \cdot 2 \cdot ext{d}_{ ext{f}} - 2 \cdot ext{d}_{ ext{f}} \cdot ext{z}_{ ext{trap}}
ight)$$

$$= \sqrt{\left((0.577)^2\right) + 1} \cdot 2 \cdot 3.3 \mathrm{m} - 2 \cdot 3.3 \mathrm{m} \cdot 0.577$$

34) Width of Channel in most Efficient Channel sections





35) Width of Channel in Most Efficient Channel when Bottom width is kept constant

 $\mathbf{E} \mathbf{B}_{ ext{trap}} = \mathbf{d}_{ ext{f}} \cdot \left(rac{1 - \left(\mathbf{z}_{ ext{trap}}^2
ight)}{\mathbf{z}_{ ext{trap}}}
ight)$

Open Calculator 🚰

36) Width of Channel in most Efficient Channels section

 $egin{aligned} \mathbf{E}_{ ext{trap}} = \left(rac{2}{\sqrt{3}}
ight) \cdot \mathrm{d}_{\mathrm{f}} \end{aligned}$

Open Calculator 🗗

Triangular Section 🗗

37) Depth of Flow given Hydraulic Radius in Most Efficient Triangular channel

 $egin{aligned} \mathbf{f_k} \ \mathrm{d_{f(\Delta)}} = \mathrm{R_{H(\Delta)}} \cdot \left(2 \cdot \sqrt{2}
ight) \end{aligned}$

Open Calculator 🗗

 $oxed{ex} 3.300774 \mathrm{m} = 1.167 \mathrm{m} \cdot \left(2 \cdot \sqrt{2}
ight)$





38) Hydraulic Radius in Efficient channel 🗲



ex $1.177333 \mathrm{m} = rac{3.33 \mathrm{m}}{2 \cdot \sqrt{2}}$



Variables Used

- A Wetted Surface Area of Channel (Square Meter)
- B_{rect} Width of Section of Rect Channel (Meter)
- Btrap Width of Trap Channel (Meter)
- C Chezy's Constant
- d_f Depth of Flow (Meter)
- D_f Depth of Flow of Channel (Meter)
- d_{f(Δ)} Depth of Flow of Triangle Channel (Meter)
- d_{section} Diameter of Section (Meter)
- p Wetted Perimeter of Channel (Meter)
- Q Discharge of Channel (Cubic Meter per Second)
- r' Radius of Channel (Meter)
- R_H Hydraulic Radius of Channel (Meter)
- R_{H(rect)} Hydraulic Radius of Rectangle (Meter)
- R_{H(Δ)} Hydraulic Radius of Triangular Channel (Meter)
- S Bed Slope
- S_{Trap} Wetted Surface Area of Trapezoidal Channel (Square Meter)
- Ztrap Side slope of Trapezoidal Channel





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: Area in Square Meter (m²)

 Area Unit Conversion
- Measurement: Volumetric Flow Rate in Cubic Meter per Second (m³/s)

 Volumetric Flow Rate Unit Conversion





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