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Geometrical Properties of Trapezoidal Channel Section Formulas

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List of 17 Geometrical Properties of Trapezoidal Channel Section Formulas

Geometrical Properties of Trapezoidal Channel Section

1) Depth of Flow given Top Width for Trapezoidal

Open Calculator

fx $$d_{f(trap)} = \frac{T_{Trap} - B_{trap}}{2 \cdot z_{trap}}$$

ex $$3.301127\text{m} = \frac{7.62\text{m} - 3.8105\text{m}}{2 \cdot 0.577}$$

2) Depth of Flow given Wetted Perimeter for Trapezoidal

Open Calculator

fx $$d_{f(trap)} = \frac{P_{Trap} - B_{trap}}{2 \cdot \left(\sqrt{z_{trap} \cdot z_{trap} + 1}\right)}$$

ex $$3.299841\text{m} = \frac{11.43\text{m} - 3.8105\text{m}}{2 \cdot \left(\sqrt{0.577 \cdot 0.577 + 1}\right)}$$

3) Hydraulic Depth for Trapezoidal

Open Calculator

$$D_{Trap} = \frac{\left(B_{trap} + d_{f(trap)} \cdot z_{trap}\right) \cdot d_{f(trap)}}{B_{trap} + 2 \cdot d_{f(trap)} \cdot z_{trap}}$$

$$2.487743\text{m} = \frac{(3.8105\text{m} + 3.32\text{m} \cdot 0.577) \cdot 3.32\text{m}}{3.8105\text{m} + 2 \cdot 3.32\text{m} \cdot 0.577}$$

4) Hydraulic Radius of Section

Open Calculator

$$R_{H(Trap)} = \frac{\left(B_{trap} + z_{trap} \cdot d_{f(trap)}\right) \cdot d_{f(trap)}}{B_{trap} + 2 \cdot d_{f(trap)} \cdot \sqrt{z_{trap}^2 + 1}}$$

$$1.65649\text{m} = \frac{(3.8105\text{m} + 0.577 \cdot 3.32\text{m}) \cdot 3.32\text{m}}{3.8105\text{m} + 2 \cdot 3.32\text{m} \cdot \sqrt{(0.577)^2 + 1}}$$

5) Section Factor for Trapezoidal

Open Calculator

$$Z_{Trap} = \frac{\left(\left(\left(B_{trap} + d_{f(trap)} \cdot z_{trap}\right) \cdot d_{f(trap)}\right)\right)^{1.5}}{\sqrt{B_{trap} + 2 \cdot d_{f(trap)} \cdot z_{trap}}}$$

$$29.98491\text{m}\hat{}2.5 = \frac{(((3.8105\text{m} + 3.32\text{m} \cdot 0.577) \cdot 3.32\text{m}))^{1.5}}{\sqrt{3.8105\text{m} + 2 \cdot 3.32\text{m} \cdot 0.577}}$$

6) Side Slope of Section given Hydraulic Depth

Open Calculator

$$z_{trap} = \frac{B_{trap} \cdot d_{f(trap)} - B_{trap} \cdot D_{Trap}}{2 \cdot D_{Trap} \cdot d_{f(trap)} - \left(d_{f(trap)}\right)^2}$$

$$0.60221 = \frac{3.8105\text{m} \cdot 3.32\text{m} - 3.8105\text{m} \cdot 2.47\text{m}}{2 \cdot 2.47\text{m} \cdot 3.32\text{m} - (3.32\text{m})^2}$$

7) Side Slope of Section given Perimeter

Open Calculator

$$z_{trap} = \sqrt{\left(\left(\frac{P_{Trap} - B_{trap}}{2 \cdot d_{f(trap)}}\right)^2\right) - 1}$$

$$0.562842 = \sqrt{\left(\left(\frac{11.43\text{m} - 3.8105\text{m}}{2 \cdot 3.32\text{m}}\right)^2\right) - 1}$$

8) Side Slope of Section given Top Width for Trapezoidal

Open Calculator

$$z_{trap} = \frac{T_{Trap} - B_{trap}}{2 \cdot d_{f(trap)}}$$

$$0.57372 = \frac{7.62\text{m} - 3.8105\text{m}}{2 \cdot 3.32\text{m}}$$

9) Side Slope of Section given Wetted Area of Trapezoidal

Open Calculator

$$z_{trap} = \frac{\left(\frac{S_{Trap}}{d_{f(trap)}}\right) - B_{trap}}{d_{f(trap)}}$$

$$0.56332 = \frac{\left(\frac{18.86\text{m}^2}{3.32\text{m}}\right) - 3.8105\text{m}}{3.32\text{m}}$$

10) Top Width for Trapezoidal

Open Calculator

$$T_{Trap} = B_{trap} + 2 \cdot d_{f(trap)} \cdot z_{trap}$$

$$7.64178\text{m} = 3.8105\text{m} + 2 \cdot 3.32\text{m} \cdot 0.577$$

11) Wetted Area for Trapezoidal

Open Calculator

$$S_{Trap} = \left(B_{trap} + z_{trap} \cdot d_{f(trap)}\right) \cdot d_{f(trap)}$$

$$19.01078\text{m}^2 = (3.8105\text{m} + 0.577 \cdot 3.32\text{m}) \cdot 3.32\text{m}$$

12) Wetted Perimeter for Trapezoidal

Open Calculator

$$P_{Trap} = B_{trap} + 2 \cdot d_{f(trap)} \cdot \left(\sqrt{z_{trap} \cdot z_{trap} + 1}\right)$$

$$11.47655\text{m} = 3.8105\text{m} + 2 \cdot 3.32\text{m} \cdot \left(\sqrt{0.577 \cdot 0.577 + 1}\right)$$

13) Width of Section given Hydraulic Depth

Open Calculator

$$B_{trap} = \frac{\left(d_{f(trap)} \cdot z_{trap} \cdot d_{f(trap)}\right) - D_{Trap} \cdot 2 \cdot d_{f(trap)} \cdot z_{trap}}{D_{Trap} - d_{f(trap)}}$$

ex $3.650984\text{m} = \frac{(3.32\text{m} \cdot 0.577 \cdot 3.32\text{m}) - 2.47\text{m} \cdot 2 \cdot 3.32\text{m} \cdot 0.577}{2.47\text{m} - 3.32\text{m}}$

14) Width of Section given Top Width

Open Calculator

$$B_{trap} = T_{Trap} - 2 \cdot d_{f(trap)} \cdot z_{trap}$$

ex $3.78872\text{m} = 7.62\text{m} - 2 \cdot 3.32\text{m} \cdot 0.577$

15) Width of Section given Wetted Area for Trapezoidal

Open Calculator

$$B_{trap} = \left(\frac{S_{Trap}}{d_{f(trap)}}\right) - \left(z_{trap} \cdot d_{f(trap)}\right)$$

ex $3.765083\text{m} = \left(\frac{18.86\text{m}^2}{3.32\text{m}}\right) - (0.577 \cdot 3.32\text{m})$

16) Width of Section given Wetted Perimeters in Section

Open Calculator

$$B_{trap} = P_{Trap} - 2 \cdot d_{f(trap)} \cdot \left(\sqrt{z_{trap} \cdot z_{trap} + 1}\right)$$

ex $3.763951\text{m} = 11.43\text{m} - 2 \cdot 3.32\text{m} \cdot \left(\sqrt{0.577 \cdot 0.577 + 1}\right)$

17) Width of Sections given Hydraulic Radius

Open Calculator

$$B_{trap} = \frac{2 \cdot R_{H(Trap)} \cdot d_{f(trap)} \cdot \sqrt{z_{trap}^2 + 1} - z_{trap} \cdot d_{f(trap)}^2}{d_{f(trap)} - R_{H(Trap)}}$$

ex $$3.765902\text{m} = \frac{2 \cdot 1.65\text{m} \cdot 3.32\text{m} \cdot \sqrt{(0.577)^2 + 1} - 0.577 \cdot (3.32\text{m})^2}{3.32\text{m} - 1.65\text{m}}$$

Variables Used

- B_{trap} Width of Trap Channel *(Meter)*
- $d_{f(trap)}$ Depth of Flow of Trapezoidal Channel *(Meter)*
- D_{Trap} Hydraulic Depth of Trapezoidal Channel *(Meter)*
- P_{Trap} Wetted Perimeter of Trapezoidal Channel *(Meter)*
- $R_{H(Trap)}$ Hydraulic Radius of Trapezoidal Channel *(Meter)*
- S_{Trap} Wetted Surface Area of Trapezoidal Channel *(Square Meter)*
- T_{Trap} Top Width of Trapezoidal Channel *(Meter)*
- z_{trap} Side slope of Trapezoidal Channel
- Z_{Trap} Section Factor of Trapezoidal *(Meter^2.5)*

Constants, Functions, Measurements used

- Function: **sqrt**, sqrt(Number)
  Square root function
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Area** in Square Meter (m²)
  Area Unit Conversion
- Measurement: **Section Factor** in Meter^2.5 (m^2.5)
  Section Factor Unit Conversion

Check other formula lists

- **Geometrical Properties of Circular Channel Section Formulas**
- **Geometrical Properties of Parabolic Channel Section Formulas**
- **Geometrical Properties of Rectangular Channel Section Formulas**
- **Geometrical Properties of Trapezoidal Channel Section Formulas**

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