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Section modulus, Hydraulic Depth and Practical Channel Sections Formulas

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List of 19 Section modulus, Hydraulic Depth and Practical Channel Sections Formulas

Section modulus, Hydraulic Depth and Practical Channel Sections

Hydraulic Depth

1) Hydraulic Depth

Open Calculator

fx $$D_{Hydraulic} = \frac{A}{T}$$

ex $$11.90476\text{m} = \frac{25\text{m}^2}{2.1\text{m}}$$

2) Hydraulic Radius or Hydraulic Mean Depth

Open Calculator

fx $$R_H = \frac{A}{p}$$

ex $$1.5625\text{m} = \frac{25\text{m}^2}{16\text{m}}$$

3) Top Width given Hydraulic Depth

Open Calculator

fx $$T = \frac{A}{D_{Hydraulic}}$$

ex $$8.333333\text{m} = \frac{25\text{m}^2}{3\text{m}}$$

4) Wetted Area given Hydraulic Depth

Open Calculator

fx $$A = D_{Hydraulic} \cdot T$$

ex $$6.3\text{m}^2 = 3\text{m} \cdot 2.1\text{m}$$

5) Wetted Area given Hydraulic Mean Depth

Open Calculator

fx $$A = R_H \cdot p$$

ex $$25.6\text{m}^2 = 1.6\text{m} \cdot 16\text{m}$$

6) Wetted Perimeter given Hydraulic Mean Depth

Open Calculator

fx $$p = \frac{A}{R_H}$$

ex $$15.625\text{m} = \frac{25\text{m}^2}{1.6\text{m}}$$

Practical Channel Sections

7) Depth of Flow given Wetted Area of Triangular Channel Section

Open Calculator

fx $$d_f = \sqrt{\frac{A}{\theta + \cot(\theta)}}$$

ex $$3.329156\text{m} = \sqrt{\frac{25\text{m}^2}{30^\circ + \cot(30^\circ)}}$$

8) Depth of Flow given Wetted Perimeter of Triangular Channel Section

Open Calculator

fx $$d_f = \frac{p}{2 \cdot (\theta + \cot(\theta))}$$

ex $$3.54665\text{m} = \frac{16\text{m}}{2 \cdot (30^\circ + \cot(30^\circ))}$$

9) Hydraulic Radius of Trapezoidal Channel Section

Open Calculator

fx $$R_H = \frac{d_f \cdot (B + d_f \cdot (\theta + \cot(\theta)))}{B + 2 \cdot d_f \cdot (\theta + \cot(\theta))}$$

ex $$1.661009\text{m} = \frac{3.3\text{m} \cdot (100\text{mm} + 3.3\text{m} \cdot (30^\circ + \cot(30^\circ)))}{100\text{mm} + 2 \cdot 3.3\text{m} \cdot (30^\circ + \cot(30^\circ))}$$

10) Hydraulic Radius of Triangular Channel Section

Open Calculator

fx $$R_H = \frac{d_f}{2}$$

ex $$1.65\text{m} = \frac{3.3\text{m}}{2}$$

11) Wetted Area of Trapezoidal Channel Section

Open Calculator

fx $$A = d_f \cdot (B + d_f \cdot (\theta + \cot(\theta)))$$

ex $$24.89402\text{m}^2 = 3.3\text{m} \cdot (100\text{mm} + 3.3\text{m} \cdot (30^\circ + \cot(30^\circ)))$$

12) Wetted Area of Triangular Channel Section

Open Calculator

fx $$A = \left(d_f^2\right) \cdot (\theta + \cot(\theta))$$

ex $$24.56402\text{m}^2 = \left((3.3\text{m})^2\right) \cdot (30^\circ + \cot(30^\circ))$$

13) Wetted Perimeter of Trapezoidal Channel Section

Open Calculator

fx $$p = (B + 2 \cdot d_f \cdot (\theta + \cot(\theta)))$$

ex $$14.98729\text{m} = (100\text{mm} + 2 \cdot 3.3\text{m} \cdot (30^\circ + \cot(30^\circ)))$$

14) Wetted Perimeter of Triangular Channel Section

Open Calculator

fx $$p = 2 \cdot d_f \cdot (\theta + \cot(\theta))$$

ex $$14.88729\text{m} = 2 \cdot 3.3\text{m} \cdot (30^\circ + \cot(30^\circ))$$

Section modulus

15) Section Modulus of Circular Section

Open Calculator

fx $$z = \frac{\pi \cdot \left(d_{section}^3\right)}{32}$$

ex $$12.27185\text{mm}^3 = \frac{\pi \cdot \left((5\text{m})^3\right)}{32}$$

16) Section Modulus of Hollow circular tube of uniform section

Open Calculator

fx $$z = \frac{\pi \cdot \left(\left(d_{section}^4\right) - \left(d_i^4\right)\right)}{32 \cdot d_{section}}$$

ex $$12.27185\text{mm}^3 = \frac{\pi \cdot \left(\left((5\text{m})^4\right) - \left((2\text{mm})^4\right)\right)}{32 \cdot 5\text{m}}$$

17) Section Modulus of Hollow Rectangular Section

Open Calculator

fx $$z = \frac{B_H \cdot \left(D^3\right) - b \cdot \left(d^3\right)}{6 \cdot D}$$

ex $$3.3\text{E}\hat{}\text{-}5\text{mm}^3 = \frac{20\text{mm} \cdot \left((100.1\text{mm})^3\right) - 10.2\text{mm} \cdot \left((10\text{mm})^3\right)}{6 \cdot 100.1\text{mm}}$$

18) Section Modulus of Rectangular Section

Open Calculator

fx $$z = \frac{B_H \cdot \left(D^2\right)}{6}$$

ex $$3.3E\hat{}\text{-}5mm^3 = \frac{20mm \cdot \left((100.1mm)^2\right)}{6}$$

19) Section Modulus of Triangular Section

Open Calculator

fx $$z = \frac{B_H \cdot \left(H_s^2\right)}{24}$$

ex $$85.00833mm^3 = \frac{20mm \cdot \left((10.1mm)^2\right)}{24}$$

Variables Used

- **A** Wetted Surface Area of Channel *(Square Meter)*
- **b** Interior Width of Section *(Millimeter)*
- **B** Width of Trapezoidal Channel Section *(Millimeter)*
- B_H Width of a Section Channel *(Millimeter)*
- **d** Interior Depth of Section *(Millimeter)*
- **D** Depth of Section *(Millimeter)*
- d_f Depth of Flow *(Meter)*
- $D_{Hydraulic}$ Hydraulic Depth *(Meter)*
- d_i Interior Diameter of Circular Section *(Millimeter)*
- $d_{section}$ Diameter of Section *(Meter)*
- H_s Height of Section *(Millimeter)*
- **p** Wetted Perimeter of Channel *(Meter)*
- R_H Hydraulic Radius of Channel *(Meter)*
- **T** Top Width *(Meter)*
- **z** Section Modulus *(Cubic Millimeter)*
- **θ** Theta *(Degree)*

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Function: **cot**, cot(Angle)
  Cotangent is a trigonometric function that is defined as the ratio of the adjacent side to the opposite side in a right triangle.
- 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), Millimeter (mm)
  Length Unit Conversion
- Measurement: **Volume** in Cubic Millimeter (mm^3)
  Volume Unit Conversion
- Measurement: **Area** in Square Meter (m^2)
  Area Unit Conversion
- Measurement: **Angle** in Degree (°)
  Angle 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**
- **Geometrical Properties of Triangular Channel Section Formulas**
- **Section modulus, Hydraulic Depth and Practical Channel Sections Formulas**

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