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Important Formulas of Toroid and Toroid Sector

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List of 17 Important Formulas of Toroid and Toroid Sector

Important Formulas of Toroid and Toroid Sector

Total Surface Area of Toroid

1) Total Surface Area of Toroid

$$\text{fx } \text{TSA} = (2 \cdot \pi \cdot r \cdot P_{\text{Cross Section}})$$

[Open Calculator !\[\]\(de95854c7ee024cfadc48187bbb781b2_img.jpg\)](#)

$$\text{ex } 1884.956\text{m}^2 = (2 \cdot \pi \cdot 10\text{m} \cdot 30\text{m})$$

2) Total Surface Area of Toroid given Volume

$$\text{fx } \text{TSA} = (2 \cdot \pi \cdot P_{\text{Cross Section}}) \cdot \left(\frac{V}{2 \cdot \pi \cdot A_{\text{Cross Section}}} \right)$$

[Open Calculator !\[\]\(6a9b39b98eb945faa14c645ec99e4eaa_img.jpg\)](#)

$$\text{ex } 1890\text{m}^2 = (2 \cdot \pi \cdot 30\text{m}) \cdot \left(\frac{3150\text{m}^3}{2 \cdot \pi \cdot 50\text{m}^2} \right)$$

Volume of Toroid

3) Volume of Toroid

$$\text{fx } V = (2 \cdot \pi \cdot r \cdot A_{\text{Cross Section}})$$

[Open Calculator !\[\]\(235bfe13ebf007ce2eea9e689707fac7_img.jpg\)](#)

$$\text{ex } 3141.593\text{m}^3 = (2 \cdot \pi \cdot 10\text{m} \cdot 50\text{m}^2)$$

4) Volume of Toroid given Total Surface Area

$$\text{fx } V = (2 \cdot \pi \cdot A_{\text{Cross Section}}) \cdot \left(\frac{\text{TSA}}{2 \cdot \pi \cdot P_{\text{Cross Section}}} \right)$$

[Open Calculator !\[\]\(291e070cef6c4d5e78fefe4696ef53be_img.jpg\)](#)

$$\text{ex } 3166.667\text{m}^3 = (2 \cdot \pi \cdot 50\text{m}^2) \cdot \left(\frac{1900\text{m}^2}{2 \cdot \pi \cdot 30\text{m}} \right)$$



Cross Sectional Area of Toroid

5) Cross Sectional Area of Toroid

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$\text{fx } A_{\text{Cross Section}} = \left(\frac{V}{2 \cdot \pi \cdot r} \right)$$

$$\text{ex } 50.13381\text{m}^2 = \left(\frac{3150\text{m}^3}{2 \cdot \pi \cdot 10\text{m}} \right)$$

6) Cross Sectional Area of Toroid given Volume and Total Surface Area

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$\text{fx } A_{\text{Cross Section}} = \left(\frac{V}{2 \cdot \pi \cdot \left(\frac{\text{TSA}}{2 \cdot \pi \cdot P_{\text{Cross Section}}} \right)} \right)$$

$$\text{ex } 49.73684\text{m}^2 = \left(\frac{3150\text{m}^3}{2 \cdot \pi \cdot \left(\frac{1900\text{m}^2}{2 \cdot \pi \cdot 30\text{m}} \right)} \right)$$

Cross Sectional Perimeter of Toroid

7) Cross Sectional Perimeter of Toroid

[Open Calculator !\[\]\(b792654f2cef9719eabeb6c5be00811e_img.jpg\)](#)

$$\text{fx } P_{\text{Cross Section}} = \left(\frac{\text{TSA}}{2 \cdot \pi \cdot r} \right)$$

$$\text{ex } 30.23944\text{m} = \left(\frac{1900\text{m}^2}{2 \cdot \pi \cdot 10\text{m}} \right)$$

8) Cross Sectional Perimeter of Toroid given Total Surface Area and Volume

[Open Calculator !\[\]\(84f47badaad7772cd95667a7c387a639_img.jpg\)](#)

$$\text{fx } P_{\text{Cross Section}} = \left(\frac{\text{TSA}}{2 \cdot \pi \cdot \left(\frac{V}{2 \cdot \pi \cdot A_{\text{Cross Section}}} \right)} \right)$$

$$\text{ex } 30.15873\text{m} = \left(\frac{1900\text{m}^2}{2 \cdot \pi \cdot \left(\frac{3150\text{m}^3}{2 \cdot \pi \cdot 50\text{m}^2} \right)} \right)$$



Radius of Toroid

9) Radius of Toroid

$$\text{fx } r = \left(\frac{\text{TSA}}{2 \cdot \pi \cdot P_{\text{Cross Section}}} \right)$$

[Open Calculator !\[\]\(23d9fc146e83b5c3013cfa32c784f8d5_img.jpg\)](#)

$$\text{ex } 10.07981\text{m} = \left(\frac{1900\text{m}^2}{2 \cdot \pi \cdot 30\text{m}} \right)$$

10) Radius of Toroid given Volume

$$\text{fx } r = \left(\frac{V}{2 \cdot \pi \cdot A_{\text{Cross Section}}} \right)$$

[Open Calculator !\[\]\(aa53ad6fea213b8b2226d3077e30533a_img.jpg\)](#)

$$\text{ex } 10.02676\text{m} = \left(\frac{3150\text{m}^3}{2 \cdot \pi \cdot 50\text{m}^2} \right)$$

Toroid Sector

11) Cross Sectional Area of Toroid given Total Surface Area of Toroid Sector

$$\text{fx } A_{\text{Cross Section}} = \left(\frac{\text{TSA}_{\text{Sector}} - \left(2 \cdot \pi \cdot r \cdot P_{\text{Cross Section}} \cdot \left(\frac{\angle_{\text{Intersection}}}{2 \cdot \pi} \right) \right)}{2} \right)$$

[Open Calculator !\[\]\(a8f9309f944226d1420f5fed22e2b6e6_img.jpg\)](#)

$$\text{ex } 53.7611\text{m}^2 = \left(\frac{1050\text{m}^2 - \left(2 \cdot \pi \cdot 10\text{m} \cdot 30\text{m} \cdot \left(\frac{180^\circ}{2 \cdot \pi} \right) \right)}{2} \right)$$


12) Cross Sectional Area of Toroid given Volume of Toroid Sector

$$\text{fx } A_{\text{Cross Section}} = \left(\frac{V_{\text{Sector}}}{2 \cdot \pi \cdot r \cdot \left(\frac{\angle_{\text{Intersection}}}{2 \cdot \pi} \right)} \right)$$

[Open Calculator !\[\]\(cbd8541a32dfc32f356f5c6c994b0a21_img.jpg\)](#)

$$\text{ex } 49.97465\text{m}^2 = \left(\frac{1570\text{m}^3}{2 \cdot \pi \cdot 10\text{m} \cdot \left(\frac{180^\circ}{2 \cdot \pi} \right)} \right)$$



13) Cross Sectional Perimeter of Toroid given Total Surface Area of Toroid Sector 

$$\text{fx } P_{\text{Cross Section}} = \frac{\text{TSA}_{\text{Sector}} - (2 \cdot A_{\text{Cross Section}})}{2 \cdot \pi \cdot r \cdot \left(\frac{\angle_{\text{Intersection}}}{2 \cdot \pi}\right)}$$

Open Calculator 

$$\text{ex } 30.23944\text{m} = \frac{1050\text{m}^2 - (2 \cdot 50\text{m}^2)}{2 \cdot \pi \cdot 10\text{m} \cdot \left(\frac{180^\circ}{2 \cdot \pi}\right)}$$


14) Total Surface Area of Toroid Sector 

fx

Open Calculator 

$$\text{TSA}_{\text{Sector}} = \left((2 \cdot \pi \cdot r \cdot P_{\text{Cross Section}}) \cdot \left(\frac{\angle_{\text{Intersection}}}{2 \cdot \pi} \right) \right) + (2 \cdot A_{\text{Cross Section}})$$

$$\text{ex } 1042.478\text{m}^2 = \left((2 \cdot \pi \cdot 10\text{m} \cdot 30\text{m}) \cdot \left(\frac{180^\circ}{2 \cdot \pi} \right) \right) + (2 \cdot 50\text{m}^2)$$

15) Total Surface Area of Toroid Sector given Volume 

fx

Open Calculator 

$$\text{TSA}_{\text{Sector}} = \left((2 \cdot \pi \cdot P_{\text{Cross Section}}) \cdot \left(\left(\frac{V_{\text{Sector}}}{2 \cdot \pi \cdot A_{\text{Cross Section}}} \right) \right) \right) + (2 \cdot A_{\text{Cross Section}})$$

$$\text{ex } 1042\text{m}^2 = \left((2 \cdot \pi \cdot 30\text{m}) \cdot \left(\left(\frac{1570\text{m}^3}{2 \cdot \pi \cdot 50\text{m}^2} \right) \right) \right) + (2 \cdot 50\text{m}^2)$$


16) Volume of Toroid Sector 

$$\text{fx } V_{\text{Sector}} = (2 \cdot \pi \cdot r \cdot A_{\text{Cross Section}}) \cdot \left(\frac{\angle_{\text{Intersection}}}{2 \cdot \pi} \right)$$

Open Calculator 

$$\text{ex } 1570.796\text{m}^3 = (2 \cdot \pi \cdot 10\text{m} \cdot 50\text{m}^2) \cdot \left(\frac{180^\circ}{2 \cdot \pi} \right)$$



17) Volume of Toroid Sector given Total Surface Area 

fx

Open Calculator 

$$V_{\text{Sector}} = (2 \cdot \pi \cdot A_{\text{Cross Section}}) \cdot \left(\left(\frac{\text{TSA}_{\text{Sector}} - (2 \cdot A_{\text{Cross Section}})}{2 \cdot \pi \cdot P_{\text{Cross Section}}} \right) \right)$$

$$\text{ex } 1583.333\text{m}^3 = (2 \cdot \pi \cdot 50\text{m}^2) \cdot \left(\left(\frac{1050\text{m}^2 - (2 \cdot 50\text{m}^2)}{2 \cdot \pi \cdot 30\text{m}} \right) \right)$$







Variables Used

- $\angle_{\text{Intersection}}$ Angle of Intersection of Toroid Sector (Degree)
- $A_{\text{Cross Section}}$ Cross Sectional Area of Toroid (Square Meter)
- $P_{\text{Cross Section}}$ Cross Sectional Perimeter of Toroid (Meter)
- r Radius of Toroid (Meter)
- TSA Total Surface Area of Toroid (Square Meter)
- TSA_{Sector} Total Surface Area of Toroid Sector (Square Meter)
- V Volume of Toroid (Cubic Meter)
- V_{Sector} Volume of Toroid Sector (Cubic Meter)



Constants, Functions, Measurements used

- **Constant:** **pi**, 3.14159265358979323846264338327950288
Archimedes' constant
- **Measurement:** **Length** in Meter (m)
Length Unit Conversion 
- **Measurement:** **Volume** in Cubic Meter (m³)
Volume Unit Conversion 
- **Measurement:** **Area** in Square Meter (m²)
Area Unit Conversion 
- **Measurement:** **Angle** in Degree (°)
Angle Unit Conversion 



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