Important Formulas of Torus and Torus Sector PDF

Formulas
Examples
with Units

List of 28
Important Formulas of Torus and Torus Sector

1) Total Surface Area of Torus Formulas

1.1) Total Surface Area of Torus Formula

Evaluate Formula

Formula

$$TSA = 4 \cdot \left(\pi^2\right) \cdot r \cdot r_{Circular\ Section}$$

Example with Units

$$3158.2734\,\text{m}^2 = 4 \cdot \left(3.1416^2\right) \cdot 10\,\text{m} \cdot 8\,\text{m}$$

1.2) Total Surface Area of Torus given Radius and Breadth Formula

Evaluate Formula

Formula

$$TSA = \left(4 \cdot \left(\pi^2\right) \cdot \left(r\right) \cdot \left(\left(\frac{b}{2}\right) - r\right)\right)$$

Example with Units

$$3158.2734\,\text{m}^2 = \left(4 \cdot \left(3.1416^2\right) \cdot \left(10\,\text{m}\right) \cdot \left(\left(\frac{36\,\text{m}}{2}\right) - 10\,\text{m}\right)\right)$$

1.3) Total Surface Area of Torus given Radius and Hole Radius Formula

Evaluate Formula

Formula

$$TSA = \left(4 \cdot \left(\pi^2\right) \cdot \left(r\right) \cdot \left(r - r_{Hole}\right)\right)$$

Example with Units

$$3158.2734\,\text{m}^2 = \left(4 \cdot \left(3.1416^2\right) \cdot \left(10\,\text{m}\right) \cdot \left(10\,\text{m} - 2\,\text{m}\right)\right)$$

1.4) Total Surface Area of Torus given Radius and Volume Formula

Evaluate Formula

Formula

$$TSA = \left(4 \cdot \left(\pi^2\right) \cdot \left(r\right) \cdot \left(\sqrt{\frac{V}{2 \cdot \pi^2 \cdot r}}\right)\right)$$

Example with Units

$$3154.134\,\text{m}^2 = \left(4 \cdot \left(3.1416^2\right) \cdot \left(10\,\text{m}\right) \cdot \left(\sqrt{\frac{12600\,\text{m}^3}{2 \cdot 3.1416^2 \cdot 10\,\text{m}}}\right)\right)$$

2) Volume of Torus Formulas

2.1) Volume of Torus Formula

Evaluate Formula

Formula

$$V = 2 \cdot \left(\pi^2\right) \cdot r \cdot \left(r_{\text{Circular Section}}^2\right)$$

Example with Units

$$12633.0936\,\text{m}^3 = 2 \cdot \left(3.1416^2\right) \cdot 10\,\text{m} \cdot \left(8\,\text{m}^2\right)$$

2.2) Volume of Torus given Radius and Breadth Formula

Evaluate Formula

Formula

$$V = \left(2 \cdot \left(\pi^2\right) \cdot \left(r\right) \cdot \left(\left(\left(\frac{b}{2}\right) - r\right)^2\right)\right)$$

Example with Units

$$12633.0936\,\text{m}^3 = \left(2 \cdot \left(3.1416^2\right) \cdot \left(10\,\text{m}\right) \cdot \left(\left(\left(\frac{36\,\text{m}}{2}\right) - 10\,\text{m}\right)^2\right)\right)$$

2.3) Volume of Torus given Radius and Hole Radius Formula

Evaluate Formula

Formula

$$V = \left(2 \cdot \left(\pi^2\right) \cdot \left(r\right) \cdot \left(\left(r - r_{\text{Hole}}\right)^2\right)\right)$$

Example with Units

$$12633.0936\,\text{m}^3 = \left(2 \cdot \left(3.1416^2\right) \cdot \left(10\,\text{m}\right) \cdot \left(\left(10\,\text{m} - 2\,\text{m}\right)^2\right)\right)$$

2.4) Volume of Torus given Radius of Circular Section and Hole Radius Formula

Evaluate Formula

Formula

$$V = \left(2 \cdot \left(\pi^2\right) \cdot \left(r_{\text{Circular Section}}^2\right) \cdot \left(r_{\text{Hole}} + r_{\text{Circular Section}}\right)\right)$$

Example with Units

$$12633.0936\,\text{m}^3 = \left(2 \cdot \left(3.1416^2\right) \cdot \left(8\,\text{m}^2\right) \cdot \left(2\,\text{m} + 8\,\text{m}\right)\right)$$

3) Breadth of Torus Formulas

3.1) Breadth of Torus Formula

Evaluate Formula

Formula

$$b = 2 \cdot \left(r + r_{\text{Circular Section}}\right)$$

Example with Units

$$36\,\text{m} = 2 \cdot \left(10\,\text{m} + 8\,\text{m}\right)$$

3.2) Breadth of Torus given Radius and Total Surface Area Formula

Evaluate Formula

Formula

$$b = 2 \cdot \left(r + \left(\frac{TSA}{4 \cdot \pi^2 \cdot r} \right) \right)$$

Example with Units

$$36.2114\,\text{m} = 2 \cdot \left(10\,\text{m} + \left(\frac{3200\,\text{m}^2}{4 \cdot 3.1416^2 \cdot 10\,\text{m}} \right) \right)$$

3.3) Breadth of Torus given Radius and Volume Formula

Evaluate Formula

Formula

$$b = 2 \cdot \left(r + \left(\sqrt{\frac{V}{2 \cdot \pi^2 \cdot r}} \right) \right)$$

Example with Units

$$35.979\,\text{m} = 2 \cdot \left(10\,\text{m} + \left(\sqrt{\frac{12600\,\text{m}^3}{2 \cdot 3.1416^2 \cdot 10\,\text{m}}} \right) \right)$$

4) Hole Radius of Torus Formulas

4.1) Hole Radius of Torus Formula

Evaluate Formula

Formula

$$r_{Hole} = r - r_{Circular\ Section}$$

Example with Units

$$2\,\text{m} = 10\,\text{m} - 8\,\text{m}$$

4.2) Hole Radius of Torus given Radius and Volume Formula

Evaluate Formula

Formula

$$r_{Hole} = r - \left(\sqrt{\frac{V}{2 \cdot \pi^2 \cdot r}} \right)$$

Example with Units

$$2.0105\,\text{m} = 10\,\text{m} - \left(\sqrt{\frac{12600\,\text{m}^3}{2 \cdot 3.1416^2 \cdot 10\,\text{m}}} \right)$$

5) Radius of Circular Section of Torus Formulas

5.1) Radius of Circular Section of Torus Formula

Evaluate Formula

Formula

$$r_{Circular\ Section} = r - r_{Hole}$$

Example with Units

$$8\,\text{m} = 10\,\text{m} - 2\,\text{m}$$

5.2) Radius of Circular Section of Torus given Radius and Volume Formula

Evaluate Formula

Formula

$$r_{Circular\ Section} = \sqrt{\frac{V}{2 \cdot \pi^2 \cdot r}}$$

Example with Units

$$7.9895\,\text{m} = \sqrt{\frac{12600\,\text{m}^3}{2 \cdot 3.1416^2 \cdot 10\,\text{m}}}$$

6) Radius of Torus Formulas

6.1) Radius of Torus Formula

Evaluate Formula

Formula

$$r = r_{Hole} + r_{Circular\ Section}$$

Example with Units

$$10\,\text{m} = 2\,\text{m} + 8\,\text{m}$$

6.2) Radius of Torus given Hole Radius and Surface to Volume Ratio Formula

Evaluate Formula

Formula

$$r = r_{Hole} + \frac{2}{R_{A/V}}$$

Example with Units

$$10\,\text{m} = 2\,\text{m} + \frac{2}{0.25\,\text{m}^{-1}}$$

6.3) Radius of Torus given Radius of Circular Section and Total Surface Area Formula

Evaluate Formula

Formula

$$r = \frac{TSA}{4 \cdot \left(\pi^2\right) \cdot r_{Circular\ Section}}$$

Example with Units

$$10.1321\,\text{m} = \frac{3200\,\text{m}^2}{4 \cdot \left(3.1416^2\right) \cdot 8\,\text{m}}$$

6.4) Radius of Torus given Radius of Circular Section and Volume Formula

Evaluate Formula

Formula

$$r = \frac{V}{2 \cdot \pi^2 \cdot r_{Circular\ Section}^2}$$

Example with Units

$$9.9738\,\text{m} = \frac{12600\,\text{m}^3}{2 \cdot 3.1416^2 \cdot 8\,\text{m}^2}$$

7) Torus Sector Formulas

7.1) Lateral Surface Area of Torus Sector Formula

Evaluate Formula

Formula

$$LSA_{Sector} = \left(4 \cdot \left(\pi^2\right) \cdot \left(r\right) \cdot \left(r_{Circular\ Section}\right) \cdot \left(\frac{\angle_{Intersection}}{2 \cdot \pi}\right)\right)$$

Example with Units

$$263.1895\,\text{m}^2 = \left(4 \cdot \left(3.1416^2\right) \cdot \left(10\,\text{m}\right) \cdot \left(8\,\text{m}\right) \cdot \left(\frac{30°}{2 \cdot 3.1416}\right)\right)$$

7.2) Lateral Surface Area of Torus Sector given Volume Formula

Evaluate Formula

Formula

$$LSA_{Sector} = 2 \cdot \left(\frac{V_{Sector}}{r_{Circular\ Section}}\right)$$

Example with Units

$$262.5\,\text{m}^2 = 2 \cdot \left(\frac{1050\,\text{m}^3}{8\,\text{m}}\right)$$

7.3) Radius of Circular Section of Torus given Lateral Surface Area of Torus Sector Formula

Evaluate Formula

Formula

$$r_{\text{Circular Section}} = \left(\frac{LSA_{\text{Sector}}}{4 \cdot \left(\pi^2 \right) \cdot \left(r \right) \cdot \left(\frac{\angle_{\text{Intersection}}}{2 \cdot \pi} \right)} \right)$$

Example with Units

$$7.9031\,\text{m} = \left(\frac{260\,\text{m}^2}{4 \cdot \left(3.1416^2 \right) \cdot \left(10\,\text{m} \right) \cdot \left(\frac{30^\circ}{2 \cdot 3.1416} \right)} \right)$$

7.4) Radius of Circular Section of Torus given Volume of Torus Sector Formula

Evaluate Formula

Formula

$$r_{\text{Circular Section}} = \sqrt{\frac{V_{\text{Sector}}}{2 \cdot \left(\pi^2 \right) \cdot \left(r \right) \cdot \left(\frac{\angle_{\text{Intersection}}}{2 \cdot \pi} \right)}}$$

Example with Units

$$7.9895\,\text{m} = \sqrt{\frac{1050\,\text{m}^3}{2 \cdot \left(3.1416^2 \right) \cdot \left(10\,\text{m} \right) \cdot \left(\frac{30^\circ}{2 \cdot 3.1416} \right)}}$$

7.5) Total Surface Area of Torus Sector Formula

Evaluate Formula

Formula

$$TSA_{\text{Sector}} = \left(LSA_{\text{Sector}} + \left(2 \cdot \pi \cdot \left(r_{\text{Circular Section}}^2 \right) \right) \right)$$

Example with Units

$$662.1239\,\text{m}^2 = \left(260\,\text{m}^2 + \left(2 \cdot 3.1416 \cdot \left(8\,\text{m}^2 \right) \right) \right)$$

7.6) Total Surface Area of Torus Sector given Lateral Surface Area and Radius Formula

Evaluate Formula

Formula

$$TSA_{Sector} = \left(LSA_{Sector} + \left(2 \cdot \pi \cdot \left(\left(\frac{LSA_{Sector}}{4 \cdot \left(\pi^2 \right) \cdot \left(r \right) \cdot \left(\frac{\angle_{Intersection}}{2 \cdot \pi} \right)} \right)^2 \right) \right) \right)$$

Example with Units

$$652.4367\,\text{m}^2 = \left(260\,\text{m}^2 + \left(2 \cdot 3.1416 \cdot \left(\left(\frac{260\,\text{m}^2}{4 \cdot \left(3.1416^2 \right) \cdot \left(10\,\text{m} \right) \cdot \left(\frac{30^\circ}{2 \cdot 3.1416} \right)} \right)^2 \right) \right) \right)$$

7.7) Volume of Torus Sector Formula

Evaluate Formula

Formula

$$V_{Sector} = \left(2 \cdot \left(\pi^2 \right) \cdot \left(r \right) \cdot \left(r_{Circular\ Section}^{\ 2} \right) \cdot \left(\frac{\angle_{Intersection}}{2 \cdot \pi} \right) \right)$$

Example with Units

$$1052.7578\,\text{m}^3 = \left(2 \cdot \left(3.1416^2 \right) \cdot \left(10\,\text{m} \right) \cdot \left(8\,\text{m}^{\ 2} \right) \cdot \left(\frac{30^\circ}{2 \cdot 3.1416} \right) \right)$$

7.8) Volume of Torus Sector given Lateral Surface Area Formula

Evaluate Formula

Formula

$$V_{Sector} = \frac{r_{Circular\ Section} \cdot LSA_{Sector}}{2}$$

Example with Units

$$1040\,\text{m}^3 = \frac{8\,\text{m} \cdot 260\,\text{m}^2}{2}$$

7.9) Volume of Torus Sector given Lateral Surface Area and Total Surface Area Formula

Evaluate Formula

Formula

$$V_{Sector} = \left(2 \cdot \left(\pi^2 \right) \cdot \left(r \right) \cdot \left(\frac{TSA_{Sector} - LSA_{Sector}}{2 \cdot \pi} \right) \cdot \left(\frac{\angle_{Intersection}}{2 \cdot \pi} \right) \right)$$

Example with Units

$$1073.3775\,\text{m}^3 = \left(2 \cdot \left(3.1416^2 \right) \cdot \left(10\,\text{m} \right) \cdot \left(\frac{670\,\text{m}^2 - 260\,\text{m}^2}{2 \cdot 3.1416} \right) \cdot \left(\frac{30^\circ}{2 \cdot 3.1416} \right) \right)$$

Variables used in list of Important Formulas of Torus and Torus Sector above

- $\angle_{Intersection}$ Angle of Intersection of Torus Sector *(Degree)*
- **b** Breadth of Torus *(Meter)*
- LSA_{Sector} Lateral Surface Area of Torus Sector *(Square Meter)*
- **r** Radius of Torus *(Meter)*
- $R_{A/V}$ Surface to Volume Ratio of Torus *(1 per Meter)*
- $r_{Circular\ Section}$ Radius of Circular Section of Torus *(Meter)*
- r_{Hole} Hole Radius of Torus *(Meter)*
- **TSA** Total Surface Area of Torus *(Square Meter)*
- TSA_{Sector} Total Surface Area of Torus Sector *(Square Meter)*
- **V** Volume of Torus *(Cubic Meter)*
- V_{Sector} Volume of Torus Sector *(Cubic Meter)*

Constants, Functions, Measurements used in list of Important Formulas of Torus and Torus Sector above

- constant(s): **pi**, 3.14159265358979323846264338327950288 *Archimedes' constant*
- Functions: **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: **Volume** in Cubic Meter (m^3) *Volume Unit Conversion*
- Measurement: **Area** in Square Meter (m^2) *Area Unit Conversion*
- Measurement: **Angle** in Degree (°) *Angle Unit Conversion*
- Measurement: **Reciprocal Length** in 1 per Meter (m^{-1}) *Reciprocal Length Unit Conversion*

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- Important Semi Ellipsoid Formulas
- Important Sharp Bent Cylinder Formulas
- Important Skewed Three Edged Prism Formulas

- Important Small Stellated Dodecahedron Formulas
- Important Solid of Revolution Formulas
- Important Sphere Formulas
- Important Spherical Cap Formulas
- Important Spherical Corner Formulas
- Important Spherical Ring Formulas
- Important Spherical Sector Formulas
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