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# Hypersphere Formulas

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# List of 9 Hypersphere Formulas

## Hypersphere

### Diameter of Hypersphere

#### 1) Diameter of Hypersphere

$$\text{fx } D = 2 \cdot r$$

[Open Calculator !\[\]\(de95854c7ee024cfadc48187bbb781b2\_img.jpg\)](#)

$$\text{ex } 10\text{m} = 2 \cdot 5\text{m}$$

#### 2) Diameter of Hypersphere given Hypervolume

$$\text{fx } D = 2 \cdot \left( \frac{2 \cdot V_{\text{Hyper}}}{\pi^2} \right)^{\frac{1}{4}}$$

[Open Calculator !\[\]\(6a9b39b98eb945faa14c645ec99e4eaa\_img.jpg\)](#)

$$\text{ex } 10.01274\text{m} = 2 \cdot \left( \frac{2 \cdot 3100\text{m}^4}{\pi^2} \right)^{\frac{1}{4}}$$

#### 3) Diameter of Hypersphere given Surface Volume

$$\text{fx } D = \left( 4 \cdot \frac{V_{\text{Surface}}}{\pi^2} \right)^{\frac{1}{3}}$$

[Open Calculator !\[\]\(f1c5da15572e3e09d343161be98f508d\_img.jpg\)](#)

$$\text{ex } 10.04385\text{m} = \left( 4 \cdot \frac{2500\text{m}^3}{\pi^2} \right)^{\frac{1}{3}}$$



## Hypervolume of Hypersphere

### 4) Hypervolume of Hypersphere

$$fx \quad V_{\text{Hyper}} = \left( \frac{\pi^2}{2} \right) \cdot (r^4)$$

[Open Calculator !\[\]\(a03a7eb2f4046e1d3c76772003e549ea\_img.jpg\)](#)

$$ex \quad 3084.251m^4 = \left( \frac{\pi^2}{2} \right) \cdot ((5m)^4)$$

### 5) Hypervolume of Hypersphere given Surface Volume

$$fx \quad V_{\text{Hyper}} = \frac{\pi^2}{2} \cdot \left( \frac{V_{\text{Surface}}}{2 \cdot \pi^2} \right)^{\frac{4}{3}}$$

[Open Calculator !\[\]\(5361750c22c4e047a52f4eac1ec2d4cc\_img.jpg\)](#)

$$ex \quad 3138.702m^4 = \frac{\pi^2}{2} \cdot \left( \frac{2500m^3}{2 \cdot \pi^2} \right)^{\frac{4}{3}}$$

## Radius of Hypersphere

### 6) Radius of Hypersphere given Hypervolume

$$fx \quad r = \left( \frac{2 \cdot V_{\text{Hyper}}}{\pi^2} \right)^{\frac{1}{4}}$$

[Open Calculator !\[\]\(7d1d6890825e83a6a4a51febe2dcc7f3\_img.jpg\)](#)

$$ex \quad 5.00637m = \left( \frac{2 \cdot 3100m^4}{\pi^2} \right)^{\frac{1}{4}}$$



## 7) Radius of Hypersphere given Surface Volume

$$\text{fx } r = \left( \frac{V_{\text{Surface}}}{2 \cdot \pi^2} \right)^{\frac{1}{3}}$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95\_img.jpg\)](#)

$$\text{ex } 5.021923\text{m} = \left( \frac{2500\text{m}^3}{2 \cdot \pi^2} \right)^{\frac{1}{3}}$$

## Surface Volume of Hypersphere

### 8) Surface Volume of Hypersphere

$$\text{fx } V_{\text{Surface}} = (2 \cdot (\pi^2)) \cdot (r^3)$$

[Open Calculator !\[\]\(aa53ad6fea213b8b2226d3077e30533a\_img.jpg\)](#)

$$\text{ex } 2467.401\text{m}^3 = (2 \cdot (\pi^2)) \cdot ((5\text{m})^3)$$

### 9) Surface Volume of Hypersphere given Hypervolume

$$\text{fx } V_{\text{Surface}} = 2 \cdot \pi^2 \cdot \left( \frac{2 \cdot V_{\text{Hyper}}}{\pi^2} \right)^{\frac{3}{4}}$$

[Open Calculator !\[\]\(626ce8ac21792b9405bfddfea8e0c96a\_img.jpg\)](#)

$$\text{ex } 2476.844\text{m}^3 = 2 \cdot \pi^2 \cdot \left( \frac{2 \cdot 3100\text{m}^4}{\pi^2} \right)^{\frac{3}{4}}$$






## Variables Used

- **D** Diameter of Hypersphere (*Meter*)
- **r** Radius of Hypersphere (*Meter*)
- **V<sub>Hyper</sub>** Hypervolume of Hypersphere (*Meter<sup>4</sup>*)
- **V<sub>Surface</sub>** Surface Volume of Hypersphere (*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 (m<sup>3</sup>)  
*Volume Unit Conversion* 
- **Measurement:** **Four-Dimensional Hypervolume** in Meter<sup>4</sup> (m<sup>4</sup>)  
*Four-Dimensional Hypervolume Unit Conversion* 



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