Important Hypersphere Formulas PDF

Formulas
Examples
with Units

List of 9
Important Hypersphere Formulas

1) Diameter of Hypersphere Formulas

1.1) Diameter of Hypersphere Formula

Evaluate Formula

Formula	Example with Units
$D = 2 \cdot r$	$10\,\text{m} = 2 \cdot 5\,\text{m}$

1.2) Diameter of Hypersphere given Hypervolume Formula

Evaluate Formula

Formula	Example with Units
$D = 2 \cdot \left(\frac{2 \cdot V_{Hyper}}{\pi^2} \right)^{\frac{1}{4}}$	$10.0127\,\text{m} = 2 \cdot \left(\frac{2 \cdot 3100\,\text{m}^4}{3.1416^2} \right)^{\frac{1}{4}}$

1.3) Diameter of Hypersphere given Surface Volume Formula

Evaluate Formula

Formula	Example with Units
$D = \left(4 \cdot \frac{V_{Surface}}{\pi^2} \right)^{\frac{1}{3}}$	$10.0438\,\text{m} = \left(4 \cdot \frac{2500\,\text{m}^3}{3.1416^2} \right)^{\frac{1}{3}}$

2) Hypervolume of Hypersphere Formulas

2.1) Hypervolume of Hypersphere Formula

Evaluate Formula

Formula	Example with Units
$V_{Hyper} = \left(\frac{\pi^2}{2} \right) \cdot \left(r^4 \right)$	$3084.2514\,\text{m}^4 = \left(\frac{3.1416^2}{2} \right) \cdot \left(5\,\text{m}^4 \right)$

2.2) Hypervolume of Hypersphere given Surface Volume Formula

Evaluate Formula

Formula	Example with Units
$V_{Hyper} = \frac{\pi^2}{2} \cdot \left(\frac{V_{Surface}}{2 \cdot \pi^2} \right)^{\frac{4}{3}}$	$3138.7022\,\text{m}^4 = \frac{3.1416^2}{2} \cdot \left(\frac{2500\,\text{m}^3}{2 \cdot 3.1416^2} \right)^{\frac{4}{3}}$

3) Radius of Hypersphere Formulas

3.1) Radius of Hypersphere given Hypervolume Formula

Evaluate Formula

Formula

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

Example with Units

$$5.0064\,\text{m} = \left(\frac{2 \cdot 3100\,\text{m}^4}{3.1416^2}\right)^{\frac{1}{4}}$$

3.2) Radius of Hypersphere given Surface Volume Formula

Evaluate Formula

Formula

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

Example with Units

$$5.0219\,\text{m} = \left(\frac{2500\,\text{m}^3}{2 \cdot 3.1416^2}\right)^{\frac{1}{3}}$$

4) Surface Volume of Hypersphere Formulas

4.1) Surface Volume of Hypersphere Formula

Evaluate Formula

Formula

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

Example with Units

$$2467.4011\,\text{m}^3 = \left(2 \cdot \left(3.1416^2\right)\right) \cdot \left(5\,\text{m}^3\right)$$

4.2) Surface Volume of Hypersphere given Hypervolume Formula

Evaluate Formula

Formula

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

Example with Units

$$2476.8443\,\text{m}^3 = 2 \cdot 3.1416^2 \cdot \left(\frac{2 \cdot 3100\,\text{m}^4}{3.1416^2}\right)^{\frac{3}{4}}$$

Variables used in list of Hypersphere Formulas above

- **D** Diameter of Hypersphere *(Meter)*
- **r** Radius of Hypersphere *(Meter)*
- V_{Hyper} Hypervolume of Hypersphere *(Meter⁴)*
- $V_{Surface}$ Surface Volume of Hypersphere *(Cubic Meter)*

Constants, Functions, Measurements used in list of Hypersphere Formulas above

- constant(s): **pi**, 3.14159265358979323846264338327950288 *Archimedes' constant*
- Measurement: **Length** in Meter (m) *Length Unit Conversion*
- Measurement: **Volume** in Cubic Meter (m³) *Volume Unit Conversion*
- Measurement: **Four-Dimensional Hypervolume** in Meter⁴ (m⁴) *Four-Dimensional Hypervolume Unit Conversion*

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