

Important Formulas of Truncated Icosahedron PDF



Formulas Examples with Units

List of 12 Important Formulas of Truncated Icosahedron

1) Circumsphere Radius of Truncated Icosahedron Formula ↻

Formula

$$r_c = \frac{\sqrt{58 + (18 \cdot \sqrt{5})}}{4} \cdot l_e$$

Example with Units

$$24.7802\text{ m} = \frac{\sqrt{58 + (18 \cdot \sqrt{5})}}{4} \cdot 10\text{ m}$$

Evaluate Formula ↻

2) Edge Length of Truncated Icosahedron given Circumsphere Radius Formula ↻

Formula

$$l_e = \frac{4 \cdot r_c}{\sqrt{58 + (18 \cdot \sqrt{5})}}$$

Example with Units

$$10.0887\text{ m} = \frac{4 \cdot 25\text{ m}}{\sqrt{58 + (18 \cdot \sqrt{5})}}$$

Evaluate Formula ↻

3) Edge Length of Truncated Icosahedron given Midsphere Radius Formula ↻

Formula

$$l_e = \frac{4 \cdot r_m}{3 \cdot (1 + \sqrt{5})}$$

Example with Units

$$9.8885\text{ m} = \frac{4 \cdot 24\text{ m}}{3 \cdot (1 + \sqrt{5})}$$

Evaluate Formula ↻

4) Edge Length of Truncated Icosahedron given Volume Formula ↻

Formula

$$l_e = \left(\frac{4 \cdot V}{125 + (43 \cdot \sqrt{5})} \right)^{\frac{1}{3}}$$

Example with Units

$$9.9826\text{ m} = \left(\frac{4 \cdot 55000\text{ m}^3}{125 + (43 \cdot \sqrt{5})} \right)^{\frac{1}{3}}$$

Evaluate Formula ↻

5) Icosahedral Edge Length of Truncated Icosahedron Formula ↻

Formula

$$l_{e(\text{Icosahedron})} = 3 \cdot l_e$$

Example with Units

$$30\text{ m} = 3 \cdot 10\text{ m}$$

Evaluate Formula ↻

6) Midsphere Radius of Truncated Icosahedron Formula ↻

Formula

$$r_m = \frac{3 \cdot (1 + \sqrt{5})}{4} \cdot l_e$$

Example with Units

$$24.2705\text{ m} = \frac{3 \cdot (1 + \sqrt{5})}{4} \cdot 10\text{ m}$$

Evaluate Formula ↻



7) Midsphere Radius of Truncated Icosahedron given Icosahedral Edge Length Formula

Formula

$$r_m = \frac{1 + \sqrt{5}}{4} \cdot l_{e(\text{Icosahedron})}$$

Example with Units

$$24.2705\text{ m} = \frac{1 + \sqrt{5}}{4} \cdot 30\text{ m}$$

Evaluate Formula 

8) Surface to Volume Ratio of Truncated Icosahedron Formula

Formula

$$R_{A/V} = \frac{12 \cdot \left((10 \cdot \sqrt{3}) + \sqrt{25 + (10 \cdot \sqrt{5})} \right)}{l_e \cdot (125 + (43 \cdot \sqrt{5}))}$$

Example with Units

$$0.1313\text{ m}^{-1} = \frac{12 \cdot \left((10 \cdot \sqrt{3}) + \sqrt{25 + (10 \cdot \sqrt{5})} \right)}{10\text{ m} \cdot (125 + (43 \cdot \sqrt{5}))}$$

Evaluate Formula 

9) Total Surface Area of Truncated Icosahedron Formula

Formula

$$\text{TSA} = 3 \cdot l_e^2 \cdot \left((10 \cdot \sqrt{3}) + \sqrt{25 + (10 \cdot \sqrt{5})} \right)$$

Example with Units

$$7260.7253\text{ m}^2 = 3 \cdot 10\text{ m}^2 \cdot \left((10 \cdot \sqrt{3}) + \sqrt{25 + (10 \cdot \sqrt{5})} \right)$$

Evaluate Formula 

10) Total Surface Area of Truncated Icosahedron given Volume Formula

Formula

$$\text{TSA} = 3 \cdot \left(\frac{4 \cdot V}{125 + (43 \cdot \sqrt{5})} \right)^{\frac{2}{3}} \cdot \left((10 \cdot \sqrt{3}) + \sqrt{25 + (10 \cdot \sqrt{5})} \right)$$

Example with Units

$$7235.5124\text{ m}^2 = 3 \cdot \left(\frac{4 \cdot 55000\text{ m}^3}{125 + (43 \cdot \sqrt{5})} \right)^{\frac{2}{3}} \cdot \left((10 \cdot \sqrt{3}) + \sqrt{25 + (10 \cdot \sqrt{5})} \right)$$

Evaluate Formula 

11) Volume of Truncated Icosahedron Formula

Formula

$$V = \frac{125 + (43 \cdot \sqrt{5})}{4} \cdot l_e^3$$

Example with Units

$$55287.7308\text{ m}^3 = \frac{125 + (43 \cdot \sqrt{5})}{4} \cdot 10\text{ m}^3$$

Evaluate Formula 



12) Volume of Truncated Icosahedron given Total Surface Area Formula

Formula

Evaluate Formula 

$$V = \frac{125 + (43 \cdot \sqrt{5})}{4} \cdot \left(\sqrt{\frac{\text{TSA}}{3 \cdot \left((10 \cdot \sqrt{3}) + \sqrt{25 + (10 \cdot \sqrt{5})} \right)}} \right)^3$$

Example with Units

$$55736.9302 \text{ m}^3 = \frac{125 + (43 \cdot \sqrt{5})}{4} \cdot \left(\sqrt{\frac{7300 \text{ m}^2}{3 \cdot \left((10 \cdot \sqrt{3}) + \sqrt{25 + (10 \cdot \sqrt{5})} \right)}} \right)^3$$



Variables used in list of Important Formulas of Truncated Icosahedron above

- l_e Edge Length of Truncated Icosahedron (Meter)
- $l_{e(\text{Icosahedron})}$ Icosahedral Edge Length of Truncated Icosahedron (Meter)
- $R_{A/V}$ Surface to Volume Ratio of Truncated Icosahedron (1 per Meter)
- r_c Circumsphere Radius of Truncated Icosahedron (Meter)
- r_m Midsphere Radius of Truncated Icosahedron (Meter)
- **TSA** Total Surface Area of Truncated Icosahedron (Square Meter)
- **V** Volume of Truncated Icosahedron (Cubic Meter)

Constants, Functions, Measurements used in list of Important Formulas of Truncated Icosahedron above

- **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 (m³)
Volume Unit Conversion 
- **Measurement:** **Area** in Square Meter (m²)
Area Unit Conversion 
- **Measurement:** **Reciprocal Length** in 1 per Meter (m⁻¹)
Reciprocal Length Unit Conversion 



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