



# Important Formulas of Truncated Icosahedron

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## List of 12 Important Formulas of Truncated Icosahedron

## Important Formulas of Truncated Icosahedron 🕑

#### 1) Circumsphere Radius of Truncated Icosahedron 🕑

fx 
$$\mathbf{r_c} = rac{\sqrt{58 + \left(18 \cdot \sqrt{5}
ight)}}{4} \cdot \mathbf{l_e}$$

ex 
$$24.78019 \mathrm{m} = rac{\sqrt{58 + \left(18 \cdot \sqrt{5}
ight)}}{4} \cdot 10 \mathrm{m}$$

#### 2) Edge Length of Truncated Icosahedron given Circumsphere Radius

fx 
$$l_{e} = rac{4 \cdot r_{c}}{\sqrt{58 + \left(18 \cdot \sqrt{5}
ight)}}$$

ex 10.08871m = 
$$\frac{4 \cdot 25m}{\sqrt{58 + \left(18 \cdot \sqrt{5}\right)}}$$

#### 3) Edge Length of Truncated Icosahedron given Midsphere Radius 🕑

fx 
$$l_e = \frac{4 \cdot r_m}{3 \cdot \left(1 + \sqrt{5}\right)}$$
  
ex  $9.888544m = \frac{4 \cdot 24m}{3 \cdot \left(1 + \sqrt{5}\right)}$ 

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### 4) Edge Length of Truncated Icosahedron given Volume 🕑

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

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

$$\int_{e} 9.982622m = \left( \frac{4 \cdot 55000m^{3}}{125 + (43 \cdot \sqrt{5})} \right)^{\frac{1}{3}}$$

$$\int_{e} 1 \text{ (cosahedral Edge Length of Truncated Icosahedron } \text{ (b)}$$

$$\int_{e} 1 \text{ (cosahedron)} = 3 \cdot 1_{e}$$

$$\int_{e} 30m = 3 \cdot 10m$$

$$\int_{e} 30m = 3 \cdot 10m$$

$$\int_{e} 1 \text{ (cosahedron)} = \frac{3 \cdot (1 + \sqrt{5})}{4} \cdot 1_{e}$$

$$\int_{e} 24.27051m = \frac{3 \cdot (1 + \sqrt{5})}{4} \cdot 10m$$

## 7) Midsphere Radius of Truncated Icosahedron given Icosahedral Edge Length 🕑

$$\mathbf{f}_{\mathbf{x}} \mathbf{r}_{\mathrm{m}} = \frac{1 + \sqrt{5}}{4} \cdot \mathbf{l}_{\mathrm{e(Icosahedron)}}$$

$$\mathbf{ex} 24.27051 \mathrm{m} = \frac{1 + \sqrt{5}}{4} \cdot 30 \mathrm{m}$$





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#### 8) Surface to Volume Ratio of Truncated Icosahedron 🕑

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

$$\mathbf{K}_{A/V} = \frac{12 \cdot \left( \left( 10 \cdot \sqrt{3} \right) + \sqrt{25 + \left( 10 \cdot \sqrt{5} \right)} \right)}{10 m \cdot \left( 125 + \left( 43 \cdot \sqrt{5} \right) \right)}$$

### 9) Total Surface Area of Truncated Icosahedron 🖸

TSA 
$$= 3 \cdot l_{ ext{e}}^2 \cdot \left( \left( 10 \cdot \sqrt{3} 
ight) + \sqrt{25 + \left( 10 \cdot \sqrt{5} 
ight)} 
ight)$$

ex 
$$7260.725m^2 = 3 \cdot (10m)^2 \cdot \left( \left( 10 \cdot \sqrt{3} \right) + \sqrt{25 + \left( 10 \cdot \sqrt{5} \right)} \right)$$

### 10) Total Surface Area of Truncated Icosahedron given Volume 🕑



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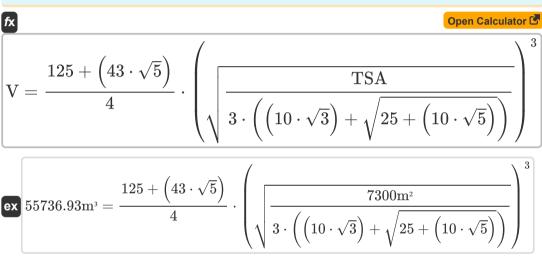
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#### 11) Volume of Truncated Icosahedron 🕑

fx 
$$V = rac{125 + (43 \cdot \sqrt{5})}{4} \cdot l_e^3$$
  
ex  $55287.73 m^3 = rac{125 + (43 \cdot \sqrt{5})}{4} \cdot (10m)^3$ 

#### 12) Volume of Truncated Icosahedron given Total Surface Area 🕑







## Variables Used

- Ie Edge Length of Truncated Icosahedron (Meter)
- Ie(Icosahedron) Icosahedral Edge Length of Truncated Icosahedron (Meter)
- RA/V Surface to Volume Ratio of Truncated Icosahedron (1 per Meter)
- **r**<sub>c</sub> Circumsphere Radius of Truncated Icosahedron (*Meter*)
- rm 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**

- Function: **sqrt**, sqrt(Number) Square root function
- Measurement: Length in Meter (m) Length Unit Conversion
- Measurement: Volume in Cubic Meter (m<sup>3</sup>) Volume Unit Conversion
- Measurement: Area in Square Meter (m<sup>2</sup>) Area Unit Conversion
- Measurement: Reciprocal Length in 1 per Meter (m<sup>-1</sup>) Reciprocal Length Unit Conversion

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