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Important Formulas of Tetrahedron

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List of 24 Important Formulas of Tetrahedron

Important Formulas of Tetrahedron

Edge Length of Tetrahedron

1) Edge Length of Tetrahedron given Circumsphere Radius

$$\text{fx } l_e = 2 \cdot \sqrt{\frac{2}{3}} \cdot r_c$$

[Open Calculator !\[\]\(de95854c7ee024cfadc48187bbb781b2_img.jpg\)](#)

$$\text{ex } 9.797959\text{m} = 2 \cdot \sqrt{\frac{2}{3}} \cdot 6\text{m}$$

2) Edge Length of Tetrahedron given Face Area

$$\text{fx } l_e = \sqrt{\frac{4 \cdot A_{\text{Face}}}{\sqrt{3}}}$$

[Open Calculator !\[\]\(6a9b39b98eb945faa14c645ec99e4eaa_img.jpg\)](#)

$$\text{ex } 10.19427\text{m} = \sqrt{\frac{4 \cdot 45\text{m}^2}{\sqrt{3}}}$$



3) Edge Length of Tetrahedron given Total Surface Area

$$fx \quad l_e = \sqrt{\frac{TSA}{\sqrt{3}}}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$ex \quad 9.907045m = \sqrt{\frac{170m^2}{\sqrt{3}}}$$

4) Edge Length of Tetrahedron given Volume

$$fx \quad l_e = \left(6 \cdot \sqrt{2} \cdot V\right)^{\frac{1}{3}}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$ex \quad 10.06041m = \left(6 \cdot \sqrt{2} \cdot 120m^3\right)^{\frac{1}{3}}$$

Height of Tetrahedron

5) Height of Tetrahedron

$$fx \quad h = \sqrt{\frac{2}{3}} \cdot l_e$$

[Open Calculator !\[\]\(b792654f2cef9719eabeb6c5be00811e_img.jpg\)](#)

$$ex \quad 8.164966m = \sqrt{\frac{2}{3}} \cdot 10m$$



6) Height of Tetrahedron given Circumsphere Radius 

$$\text{fx } h = \frac{4}{3} \cdot r_c$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

$$\text{ex } 8\text{m} = \frac{4}{3} \cdot 6\text{m}$$

7) Height of Tetrahedron given Face Area 

$$\text{fx } h = \sqrt{\frac{8 \cdot A_{\text{Face}}}{3 \cdot \sqrt{3}}}$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

$$\text{ex } 8.323583\text{m} = \sqrt{\frac{8 \cdot 45\text{m}^2}{3 \cdot \sqrt{3}}}$$

8) Height of Tetrahedron given Volume 

$$\text{fx } h = \sqrt{\frac{2}{3}} \cdot (6 \cdot \sqrt{2} \cdot V)^{\frac{1}{3}}$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

$$\text{ex } 8.214293\text{m} = \sqrt{\frac{2}{3}} \cdot (6 \cdot \sqrt{2} \cdot 120\text{m}^3)^{\frac{1}{3}}$$



Radius of Tetrahedron

9) Circumsphere Radius of Tetrahedron

$$\text{fx } r_c = \frac{1}{2} \cdot \sqrt{\frac{3}{2}} \cdot l_e$$

[Open Calculator !\[\]\(74d4806277d7e73349d8e8c0897931e9_img.jpg\)](#)

$$\text{ex } 6.123724\text{m} = \frac{1}{2} \cdot \sqrt{\frac{3}{2}} \cdot 10\text{m}$$

10) Circumsphere Radius of Tetrahedron given Height

$$\text{fx } r_c = \frac{3}{4} \cdot h$$

[Open Calculator !\[\]\(8bba887393ca45b761e5cb49e755e762_img.jpg\)](#)

$$\text{ex } 6\text{m} = \frac{3}{4} \cdot 8\text{m}$$

11) Insphere Radius of Tetrahedron

$$\text{fx } r_i = \frac{l_e}{2 \cdot \sqrt{6}}$$

[Open Calculator !\[\]\(0fb13ad0bfa3d86868cdd3883e5665b3_img.jpg\)](#)


$$\text{ex } 2.041241\text{m} = \frac{10\text{m}}{2 \cdot \sqrt{6}}$$



12) Insphere Radius of Tetrahedron given Face Area [Open Calculator](#) 

$$fx \quad r_i = \frac{\sqrt{\frac{4 \cdot A_{\text{Face}}}{\sqrt{3}}}}{2 \cdot \sqrt{6}}$$

$$ex \quad 2.080896m = \frac{\sqrt{\frac{4 \cdot 45m^2}{\sqrt{3}}}}{2 \cdot \sqrt{6}}$$

13) Midsphere Radius of Tetrahedron [Open Calculator](#) 

$$fx \quad r_m = \frac{l_e}{2 \cdot \sqrt{2}}$$

$$ex \quad 3.535534m = \frac{10m}{2 \cdot \sqrt{2}}$$

14) Midsphere Radius of Tetrahedron given Insphere Radius [Open Calculator](#) 

$$fx \quad r_m = \sqrt{3} \cdot r_i$$

$$ex \quad 3.464102m = \sqrt{3} \cdot 2m$$



Surface Area of Tetrahedron

15) Face Area of Tetrahedron

$$\text{fx } A_{\text{Face}} = \frac{\sqrt{3}}{4} \cdot l_e^2$$

[Open Calculator !\[\]\(83f22ed94ec5517769dd76d702c6bfd8_img.jpg\)](#)

$$\text{ex } 43.30127\text{m}^2 = \frac{\sqrt{3}}{4} \cdot (10\text{m})^2$$

16) Face Area of Tetrahedron given Insphere Radius

$$\text{fx } A_{\text{Face}} = 6 \cdot \sqrt{3} \cdot r_i^2$$

[Open Calculator !\[\]\(3cb60d42b10e53f9522bb0b392c1c4cd_img.jpg\)](#)

$$\text{ex } 41.56922\text{m}^2 = 6 \cdot \sqrt{3} \cdot (2\text{m})^2$$

17) Total Surface Area of Tetrahedron

$$\text{fx } \text{TSA} = \sqrt{3} \cdot l_e^2$$

[Open Calculator !\[\]\(0d7ca0919e6c47bbd874bfa0189fe22e_img.jpg\)](#)

$$\text{ex } 173.2051\text{m}^2 = \sqrt{3} \cdot (10\text{m})^2$$

18) Total Surface Area of Tetrahedron given Circumsphere Radius

$$\text{fx } \text{TSA} = \sqrt{3} \cdot \left(\frac{2 \cdot \sqrt{2} \cdot r_c}{\sqrt{3}} \right)^2$$

[Open Calculator !\[\]\(683dba75afe26e28cd4de5730b776760_img.jpg\)](#)

$$\text{ex } 166.2769\text{m}^2 = \sqrt{3} \cdot \left(\frac{2 \cdot \sqrt{2} \cdot 6\text{m}}{\sqrt{3}} \right)^2$$



19) Total Surface Area of Tetrahedron given Height 

$$\text{fx } \text{TSA} = \sqrt{3} \cdot \left(\sqrt{\frac{3}{2}} \cdot h \right)^2$$

Open Calculator 

$$\text{ex } 166.2769\text{m}^2 = \sqrt{3} \cdot \left(\sqrt{\frac{3}{2}} \cdot 8\text{m} \right)^2$$

20) Total Surface Area of Tetrahedron given Volume 

$$\text{fx } \text{TSA} = \sqrt{3} \cdot \left(\frac{12 \cdot V}{\sqrt{2}} \right)^{\frac{2}{3}}$$

Open Calculator 

$$\text{ex } 175.3042\text{m}^2 = \sqrt{3} \cdot \left(\frac{12 \cdot 120\text{m}^3}{\sqrt{2}} \right)^{\frac{2}{3}}$$

Volume of Tetrahedron 21) Volume of Tetrahedron 

$$\text{fx } V = \frac{l_e^3}{6 \cdot \sqrt{2}}$$

Open Calculator 


$$\text{ex } 117.8511\text{m}^3 = \frac{(10\text{m})^3}{6 \cdot \sqrt{2}}$$



22) Volume of Tetrahedron given Face Area [Open Calculator !\[\]\(666e09182d4cd268646ea700ea60dcdf_img.jpg\)](#)

$$\text{fx } V = \frac{\left(\frac{4 \cdot A_{\text{Face}}}{\sqrt{3}}\right)^{\frac{3}{2}}}{6 \cdot \sqrt{2}}$$

$$\text{ex } 124.8537\text{m}^3 = \frac{\left(\frac{4 \cdot 45\text{m}^2}{\sqrt{3}}\right)^{\frac{3}{2}}}{6 \cdot \sqrt{2}}$$

23) Volume of Tetrahedron given Height [Open Calculator !\[\]\(003082e50e3009141f59bd5df831749f_img.jpg\)](#)

$$\text{fx } V = \frac{\left(\sqrt{\frac{3}{2}} \cdot h\right)^3}{6 \cdot \sqrt{2}}$$

$$\text{ex } 110.8513\text{m}^3 = \frac{\left(\sqrt{\frac{3}{2}} \cdot 8\text{m}\right)^3}{6 \cdot \sqrt{2}}$$

24) Volume of Tetrahedron given Total Surface Area [Open Calculator !\[\]\(d3102649f02e825ddb76dc3de0190154_img.jpg\)](#)

$$\text{fx } V = \frac{\sqrt{2}}{12} \cdot \left(\frac{\text{TSA}}{\sqrt{3}}\right)^{\frac{3}{2}}$$

$$\text{ex } 114.5951\text{m}^3 = \frac{\sqrt{2}}{12} \cdot \left(\frac{170\text{m}^2}{\sqrt{3}}\right)^{\frac{3}{2}}$$






Variables Used

- **A_{Face}** Face Area of Tetrahedron (Square Meter)
- **h** Height of Tetrahedron (Meter)
- **l_e** Edge Length of Tetrahedron (Meter)
- **r_c** Circumsphere Radius of Tetrahedron (Meter)
- **r_i** Insphere Radius of Tetrahedron (Meter)
- **r_m** Midsphere Radius of Tetrahedron (Meter)
- **TSA** Total Surface Area of Tetrahedron (Square Meter)
- **V** Volume of Tetrahedron (Cubic Meter)



Constants, Functions, Measurements used

- **Function:** **sqrt**, $\text{sqrt}(\text{Number})$
Square root function
- **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 



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