Important Formulas of Tetrahedron PDF

Formulas
Examples
with Units

List of 24
Important Formulas of Tetrahedron

1) Edge Length of Tetrahedron Formulas

1.1) Edge Length of Tetrahedron given Circumsphere Radius Formula

Evaluate Formula

Formula

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

Example with Units

$$9.798\,\text{m} = 2 \cdot \sqrt{\frac{2}{3}} \cdot 6\,\text{m}$$

1.2) Edge Length of Tetrahedron given Face Area Formula

Evaluate Formula

Formula

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

Example with Units

$$10.1943\,\text{m} = \sqrt{\frac{4 \cdot 45\,\text{m}^2}{\sqrt{3}}}$$

1.3) Edge Length of Tetrahedron given Total Surface Area Formula

Evaluate Formula

Formula

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

Example with Units

$$9.907\,\text{m} = \sqrt{\frac{170\,\text{m}^2}{\sqrt{3}}}$$

1.4) Edge Length of Tetrahedron given Volume Formula

Evaluate Formula

Formula

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

Example with Units

$$10.0604\,\text{m} = \left(6 \cdot \sqrt{2} \cdot 120\,\text{m}^3\right)^{\frac{1}{3}}$$

2) Height of Tetrahedron Formulas

2.1) Height of Tetrahedron Formula

Evaluate Formula

Formula

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

Example with Units

$$8.165\,\text{m} = \sqrt{\frac{2}{3}} \cdot 10\,\text{m}$$

2.2) Height of Tetrahedron given Circumsphere Radius Formula

Evaluate Formula

Formula

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

Example with Units

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

2.3) Height of Tetrahedron given Face Area Formula

Evaluate Formula

Formula

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

Example with Units

$$8.3236\,\text{m} = \sqrt{\frac{8 \cdot 45\,\text{m}^2}{3 \cdot \sqrt{3}}}$$

2.4) Height of Tetrahedron given Volume Formula

Evaluate Formula

Formula

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

Example with Units

$$8.2143\,\text{m} = \sqrt{\frac{2}{3}} \cdot \left(6 \cdot \sqrt{2} \cdot 120\,\text{m}^3\right)^{\frac{1}{3}}$$

3) Radius of Tetrahedron Formulas

3.1) Circumsphere Radius of Tetrahedron Formula

Evaluate Formula

Formula

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

Example with Units

$$6.1237\,\text{m} = \frac{1}{2} \cdot \sqrt{\frac{3}{2}} \cdot 10\,\text{m}$$

3.2) Circumsphere Radius of Tetrahedron given Height Formula

Evaluate Formula

Formula

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

Example with Units

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

3.3) Insphere Radius of Tetrahedron Formula

Evaluate Formula

Formula

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

Example with Units

$$2.0412\,\text{m} = \frac{10\,\text{m}}{2 \cdot \sqrt{6}}$$

3.4) Insphere Radius of Tetrahedron given Face Area Formula

Evaluate Formula

Formula

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

Example with Units

$$2.0809\,\text{m} = \frac{\sqrt{\frac{4 \cdot 45\,\text{m}^2}{\sqrt{3}}}}{2 \cdot \sqrt{6}}$$

3.5) Midsphere Radius of Tetrahedron Formula

Evaluate Formula

Formula

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

Example with Units

$$3.5355\,\text{m} = \frac{10\,\text{m}}{2 \cdot \sqrt{2}}$$

3.6) Midsphere Radius of Tetrahedron given Insphere Radius Formula

Evaluate Formula

Formula

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

Example with Units

$$3.4641\,\text{m} = \sqrt{3} \cdot 2\,\text{m}$$

4) Surface Area of Tetrahedron Formulas

4.1) Face Area of Tetrahedron Formula

Evaluate Formula

Formula

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

Example with Units

$$43.3013\,\text{m}^2 = \frac{\sqrt{3}}{4} \cdot 10\,\text{m}^2$$

4.2) Face Area of Tetrahedron given Insphere Radius Formula

Evaluate Formula

Formula

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

Example with Units

$$41.5692\,\text{m}^2 = 6 \cdot \sqrt{3} \cdot 2\,\text{m}^2$$

4.3) Total Surface Area of Tetrahedron Formula

Evaluate Formula

Formula

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

Example with Units

$$173.2051\,\text{m}^2 = \sqrt{3} \cdot 10\,\text{m}^2$$

4.4) Total Surface Area of Tetrahedron given Circumsphere Radius Formula

Evaluate Formula

Formula

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

Example with Units

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

4.5) Total Surface Area of Tetrahedron given Height Formula

Evaluate Formula

Formula

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

Example with Units

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

4.6) Total Surface Area of Tetrahedron given Volume Formula

Evaluate Formula

Formula

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

Example with Units

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

5) Volume of Tetrahedron Formulas

5.1) Volume of Tetrahedron Formula

Evaluate Formula

Formula

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

Example with Units

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

5.2) Volume of Tetrahedron given Face Area Formula

Evaluate Formula

Formula

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

Example with Units

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

5.3) Volume of Tetrahedron given Height Formula

Evaluate Formula

Formula

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

Example with Units

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

5.4) Volume of Tetrahedron given Total Surface Area Formula

Evaluate Formula

Formula

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

Example with Units

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

Variables used in list of Important Formulas of Tetrahedron above

- 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 in list of Important Formulas of Tetrahedron 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 (m^3)
  Volume Unit Conversion
- Measurement: **Area** in Square Meter (m^2)
  Area Unit Conversion

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