Important Formulas of Snub Dodecahedron PDF

Formulas
Examples
with Units

List of 11
Important Formulas of Snub Dodecahedron

1) Circumsphere Radius of Snub Dodecahedron Formula

Evaluate Formula

Formula

$$r_c = \frac{\sqrt{\frac{2 - 0.94315125924}{1 - 0.94315125924}}}{2} \cdot l_e$$

Example with Units

$$21.5584\,\text{m} = \frac{\sqrt{\frac{2 - 0.94315125924}{1 - 0.94315125924}}}{2} \cdot 10\,\text{m}$$

2) Edge Length of Snub Dodecahedron given Circumsphere Radius Formula

Evaluate Formula

Formula

$$l_e = \frac{2 \cdot r_c}{\sqrt{\frac{2 - 0.94315125924}{1 - 0.94315125924}}}$$

Example with Units

$$10.2049\,\text{m} = \frac{2 \cdot 22\,\text{m}}{\sqrt{\frac{2 - 0.94315125924}{1 - 0.94315125924}}}$$

3) Edge Length of Snub Dodecahedron given Volume Formula

Evaluate Formula

Formula

$$l_e = \left(\frac{V \cdot 6 \cdot \left(3 - \left(\left(\frac{[phi]}{2} + \frac{\sqrt{[phi] - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} + \left(\frac{[phi]}{2} - \frac{\sqrt{[phi] - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} \right)^2 \right)^{\frac{3}{2}}}{\left((12 \cdot ((3 \cdot [phi]) + 1)) \cdot \left(\left(\left(\frac{[phi]}{2} + \frac{\sqrt{[phi] - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} + \left(\frac{[phi]}{2} - \frac{\sqrt{[phi] - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} \right)^2 \right) - \left(((36 \cdot [phi]) + 7) \cdot \left(\left(\frac{[phi]}{2} + \frac{\sqrt{[phi] - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} + \left(\frac{[phi]}{2} - \frac{\sqrt{[phi] - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} \right) \right) \right) - ((} \right)$$

Example with Units

$$10.0339\,\text{m} = \left(\frac{38000\,\text{m}^3 \cdot 6 \cdot \left(3 - \left(\left(\frac{1.618}{2} + \frac{\sqrt{1.618 - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} + \left(\frac{1.618}{2} - \frac{\sqrt{1.618 - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} \right)^2 \right)^{\frac{3}{2}}}{\left((12 \cdot ((3 \cdot 1.618) + 1)) \cdot \left(\left(\left(\frac{1.618}{2} + \frac{\sqrt{1.618 - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} + \left(\frac{1.618}{2} - \frac{\sqrt{1.618 - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} \right)^2 \right) - \left(((36 \cdot 1.618) + 7) \cdot \left(\left(\frac{1.618}{2} + \frac{\sqrt{1.618 - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} + \left(\frac{1.618}{2} - \frac{\sqrt{1.618 - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} \right) \right) \right) - ((} \right)$$

4) Midsphere Radius of Snub Dodecahedron Formula

Evaluate Formula

Formula

$$r_m = \frac{\sqrt{\frac{1}{1 - 0.94315125924}}}{2} \cdot l_e$$

Example with Units

$$20.9705\,\text{m} = \frac{\sqrt{\frac{1}{1 - 0.94315125924}}}{2} \cdot 10\,\text{m}$$

5) Surface to Volume Ratio of Snub Dodecahedron Formula

Evaluate Formula

Formula

$$R_{A/V} = \frac{\left(\left(20\cdot\sqrt{3}\right)+\left(3\cdot\sqrt{25+\left(10\cdot\sqrt{5}\right)}\right)\right)\cdot 6\cdot\left(3-\left(\left(\frac{[phi]}{2}+\sqrt{\frac{[phi]-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)+\left(\frac{[phi]}{2}-\sqrt{\frac{[phi]-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)\right)^2\right)^{\frac{3}{2}}}{l_e\cdot\left(\left(12\cdot\left(\left(3\cdot[phi]\right)+1\right)\right)\cdot\left(\left(\left(\frac{[phi]}{2}+\sqrt{\frac{[phi]-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)+\left(\frac{[phi]}{2}-\sqrt{\frac{[phi]-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)\right)^2\right)-\left(\left(\left(36\cdot[phi]\right)+7\right)\cdot\left(\left(\frac{[phi]}{2}+\sqrt{\frac{[phi]-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)+\left(\frac{[phi]}{2}-\sqrt{\frac{[phi]-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)\right)\right)\right)}$$

Example with Units

$$0.147\,\mathrm{m^{-1}} = \frac{\left(\left(20\cdot\sqrt{3}\right)+\left(3\cdot\sqrt{25+\left(10\cdot\sqrt{5}\right)}\right)\right)\cdot 6\cdot\left(3-\left(\left(\frac{1.618}{2}+\sqrt{\frac{1.618-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)+\left(\frac{1.618}{2}-\sqrt{\frac{1.618-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)\right)^2\right)^{\frac{3}{2}}}{10\,\mathrm{m}\cdot\left(\left(12\cdot\left(\left(3\cdot 1.618\right)+1\right)\right)\cdot\left(\left(\left(\frac{1.618}{2}+\sqrt{\frac{1.618-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)+\left(\frac{1.618}{2}-\sqrt{\frac{1.618-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)\right)^2\right)-\left(\left(\left(36\cdot 1.618\right)+7\right)\cdot\left(\left(\frac{1.618}{2}+\sqrt{\frac{1.618-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)+\left(\frac{1.618}{2}-\sqrt{\frac{1.618-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)\right)\right)\right)}$$

6) Surface to Volume Ratio of Snub Dodecahedron given Circumsphere Radius Formula

Evaluate Formula

Formula

$$R_{A/V} = \frac{\left(\left(20\cdot\sqrt{3}\right)+\left(3\cdot\sqrt{25+\left(10\cdot\sqrt{5}\right)}\right)\right)\cdot 6\cdot\left(3-\left(\left(\frac{[phi]}{2}+\sqrt{\frac{[phi]-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)+\left(\frac{[phi]}{2}-\sqrt{\frac{[phi]-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)\right)^2\right)^{\frac{3}{2}}}{\frac{2\cdot r_c}{\sqrt{\frac{2-0.94315125924}{1-0.94315125924}}}\cdot\left(\left(12\cdot\left(\left(3\cdot[phi]\right)+1\right)\right)\cdot\left(\left(\left(\frac{[phi]}{2}+\sqrt{\frac{[phi]-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)+\left(\frac{[phi]}{2}-\sqrt{\frac{[phi]-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)\right)^2\right)-\left(\left(\left(36\cdot[phi]\right)+7\right)\cdot\left(\left(\frac{[phi]}{2}+\sqrt{\frac{[phi]-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)+\left(\frac{[phi]}{2}-\sqrt{\frac{[phi]-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)\right)\right)\right)}$$

Example with Units

$$0.144\,\mathrm{m^{-1}} = \frac{\left(\left(20\cdot\sqrt{3}\right)+\left(3\cdot\sqrt{25+\left(10\cdot\sqrt{5}\right)}\right)\right)\cdot 6\cdot\left(3-\left(\left(\frac{1.618}{2}+\sqrt{\frac{1.618-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)+\left(\frac{1.618}{2}-\sqrt{\frac{1.618-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)\right)^2\right)^{\frac{3}{2}}}{\frac{2\cdot 22\,\mathrm{m}}{\sqrt{\frac{2-0.94315125924}{1-0.94315125924}}}\cdot\left(\left(12\cdot\left(\left(3\cdot 1.618\right)+1\right)\right)\cdot\left(\left(\left(\frac{1.618}{2}+\sqrt{\frac{1.618-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)+\left(\frac{1.618}{2}-\sqrt{\frac{1.618-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)\right)^2\right)-\left(\left(\left(36\cdot 1.618\right)+7\right)\cdot\left(\left(\frac{1.618}{2}+\sqrt{\frac{1.618-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)+\left(\frac{1.618}{2}-\sqrt{\frac{1.618-\frac{5}{27}}{2}}^{\frac{1}{3}}\right)\right)\right)\right)}$$

7) Total Surface Area of Snub Dodecahedron Formula

Evaluate Formula

Formula

$$TSA = \left(\left(20\cdot\sqrt{3}\right)+\left(3\cdot\sqrt{25+\left(10\cdot\sqrt{5}\right)}\right)\right)\cdot l_e^{\,2}$$

Example with Units

$$5528.6745\,\mathrm{m^2} = \left(\left(20\cdot\sqrt{3}\right)+\left(3\cdot\sqrt{25+\left(10\cdot\sqrt{5}\right)}\right)\right)\cdot 10\,\mathrm{m}^{\,2}$$

8) Total Surface Area of Snub Dodecahedron given Midsphere Radius Formula

Evaluate Formula

Formula

$$TSA = \left(\left(20 \cdot \sqrt{3} \right) + \left(3 \cdot \sqrt{25 + \left(10 \cdot \sqrt{5} \right)} \right) \right) \cdot \left(\frac{2 \cdot r_m}{\sqrt{\frac{1}{1 - 0.94315125924}}} \right)^2$$

Example with Units

$$5544.22\,\mathrm{m^2} = \left(\left(20 \cdot \sqrt{3} \right) + \left(3 \cdot \sqrt{25 + \left(10 \cdot \sqrt{5} \right)} \right) \right) \cdot \left(\frac{2 \cdot 21\,\mathrm{m}}{\sqrt{\frac{1}{1 - 0.94315125924}}} \right)^2$$

9) Total Surface Area of Snub Dodecahedron given Volume Formula

Evaluate Formula

Formula

$$TSA = \left(\left(20 \cdot \sqrt{3} \right) + \left(3 \cdot \sqrt{25 + \left(10 \cdot \sqrt{5} \right)} \right) \right) \cdot \left(\frac{V \cdot 6 \cdot \left(3 - \left(\left(\frac{[phi]}{2} + \frac{\sqrt{[phi] - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} + \left(\frac{[phi]}{2} - \frac{\sqrt{[phi] - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} \right) \cdots \right)}{\left(\left(12 \cdot \left(\left(3 \cdot [phi] \right) + 1 \right) \right) \cdot \left(\left(\left(\frac{[phi]}{2} + \frac{\sqrt{[phi] - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} + \left(\frac{[phi]}{2} - \frac{\sqrt{[phi] - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} \right)^2 \right) - \left(\left(36 \cdot [phi] \right) + 7 \right) \cdot \left(\left(\frac{[phi]}{2} + \cdots \right. \right. \right.} \right. \cdots$$

Example with Units

$$5566.1727\,\mathrm{m^2} = \left(\left(20 \cdot \sqrt{3} \right) + \left(3 \cdot \sqrt{25 + \left(10 \cdot \sqrt{5} \right)} \right) \right) \cdot \left(\frac{38000\,\mathrm{m^3} \cdot 6 \cdot \left(3 - \left(\left(\frac{1.618}{2} + \frac{\sqrt{1.618 - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} + \left(\frac{1.61\cdots}{2} \cdots \right. \right. \right.}{\left(\left(12 \cdot \left(\left(3 \cdot 1.618 \right) + 1 \right) \right) \cdot \left(\left(\left(\frac{1.618}{2} + \frac{\sqrt{1.618 - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} + \left(\frac{1.618}{2} - \frac{\sqrt{1.618 - \frac{5}{27}}}{2} \right)^{\frac{1}{3}} \right)^2 \right) - \left(\left(36 \cdot 1.618 \right) + 7 \cdots \right. \right.} \right. \cdots$$

10) Volume of Snub Dodecahedron Formula

Evaluate Formula

Formula

$$V = \frac{\left((12\cdot((3\cdot[phi])+1))\cdot\left(\left(\left(\frac{[phi]}{2}+\frac{\sqrt{[phi]-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}+\left(\frac{[phi]}{2}-\frac{\sqrt{[phi]-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}\right)^{2}\right)-\left(((36\cdot[phi])+7)\cdot\left(\left(\frac{[phi]}{2}+\frac{\sqrt{[phi]-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}+\left(\frac{[phi]}{2}-\frac{\sqrt{[phi]-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}\right)\right)\right)-((5$$
$$6\cdot\left(3-\left(\left(\frac{[phi]}{2}+\frac{\sqrt{[phi]-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}+\left(\frac{[phi]}{2}-\frac{\sqrt{[phi]-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}\right)^{2}\right)^{\frac{3}{2}}$$

Example with Units

$$37616.65\,\text{m}^3 = \frac{\left((12\cdot((3\cdot1.618)+1))\cdot\left(\left(\left(\frac{1.618}{2}+\frac{\sqrt{1.618-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}+\left(\frac{1.618}{2}-\frac{\sqrt{1.618-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}\right)^{2}\right)-\left(((36\cdot1.618)+7)\cdot\left(\left(\frac{1.618}{2}+\frac{\sqrt{1.618-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}+\left(\frac{1.618}{2}-\frac{\sqrt{1.618-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}\right)\right)\right)}{6\cdot\left(3-\left(\left(\frac{1.618}{2}+\frac{\sqrt{1.618-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}+\left(\frac{1.618}{2}-\frac{\sqrt{1.618-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}\right)^{2}\right)^{\frac{3}{2}}}$$

11) Volume of Snub Dodecahedron given Total Surface Area Formula

Evaluate Formula

Formula

$$V = \frac{\left((12\cdot((3\cdot[phi])+1))\cdot\left(\left(\left(\frac{[phi]}{2}+\frac{\sqrt{[phi]-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}+\left(\frac{[phi]}{2}-\frac{\sqrt{[phi]-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}\right)^{2}\right)-\left(((36\cdot[phi])+7)\cdot\left(\left(\frac{[phi]}{2}+\frac{\sqrt{[phi]-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}+\left(\frac{[phi]}{2}-\frac{\sqrt{[phi]-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}\right)\right)\right)-((5$$
$$6\cdot\left(3-\left(\left(\frac{[phi]}{2}+\frac{\sqrt{[phi]-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}+\left(\frac{[phi]}{2}-\frac{\sqrt{[phi]-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}\right)^{2}\right)^{\frac{3}{2}}$$

Example with Units

$$37324.3814\,\text{m}^3 = \frac{\left((12\cdot((3\cdot1.618)+1))\cdot\left(\left(\left(\frac{1.618}{2}+\frac{\sqrt{1.618-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}+\left(\frac{1.618}{2}-\frac{\sqrt{1.618-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}\right)^{2}\right)-\left(((36\cdot1.618)+7)\cdot\left(\left(\frac{1.618}{2}+\frac{\sqrt{1.618-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}+\left(\frac{1.618}{2}-\frac{\sqrt{1.618-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}\right)\right)\right)}{6\cdot\left(3-\left(\left(\frac{1.618}{2}+\frac{\sqrt{1.618-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}+\left(\frac{1.618}{2}-\frac{\sqrt{1.618-\frac{5}{27}}}{2}\right)^{\frac{1}{3}}\right)^{2}\right)^{\frac{3}{2}}}$$

Variables used in list of Important Formulas of Snub Dodecahedron above

- l_e Edge Length of Snub Dodecahedron *(Meter)*
- $R_{A/V}$ Surface to Volume Ratio of Snub Dodecahedron *(1 per Meter)*
- r_c Circumsphere Radius of Snub Dodecahedron *(Meter)*
- r_m Midsphere Radius of Snub Dodecahedron *(Meter)*
- **TSA** Total Surface Area of Snub Dodecahedron *(Square Meter)*
- **V** Volume of Snub Dodecahedron *(Cubic Meter)*

Constants, Functions, Measurements used in list of Important Formulas of Snub Dodecahedron above

- constant(s): **[phi]**, 1.61803398874989484820458683436563811
  Golden ratio
- 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
- Measurement: **Reciprocal Length** in 1 per Meter (m^{-1})
  Reciprocal Length Unit Conversion

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