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Pentagonal Cupola Formulas

Calculators! Examples! Conversions!

List of 20 Pentagonal Cupola Formulas

Pentagonal Cupola

Edge Length of Pentagonal Cupola

1) Edge Length of Pentagonal Cupola given Height

Open Calculator

fx $$l_e = \frac{h}{\sqrt{1-\left(\frac{1}{4}\cdot \cos ec\left(\frac{\pi}{5}\right)^2\right)}}$$

ex $$9.510565\text{m} = \frac{5\text{m}}{\sqrt{1-\left(\frac{1}{4}\cdot \cos ec\left(\frac{\pi}{5}\right)^2\right)}}$$

2) Edge Length of Pentagonal Cupola given Surface to Volume Ratio

Open Calculator

fx $$l_e = \frac{\frac{1}{4}\cdot\left(20+\left(5\cdot\sqrt{3}\right)+\sqrt{5\cdot\left(145+\left(62\cdot\sqrt{5}\right)\right)}\right)}{\frac{1}{6}\cdot\left(5+\left(4\cdot\sqrt{5}\right)\right)\cdot R_{A/V}}$$

ex $$10.19143\text{m} = \frac{\frac{1}{4}\cdot\left(20+\left(5\cdot\sqrt{3}\right)+\sqrt{5\cdot\left(145+\left(62\cdot\sqrt{5}\right)\right)}\right)}{\frac{1}{6}\cdot\left(5+\left(4\cdot\sqrt{5}\right)\right)\cdot 0.7\text{m}^{-1}}$$

3) Edge Length of Pentagonal Cupola given Total Surface Area

Open Calculator

fx $$l_e = \sqrt{\frac{TSA}{\frac{1}{4}\cdot\left(20+\left(5\cdot\sqrt{3}\right)+\sqrt{5\cdot\left(145+\left(62\cdot\sqrt{5}\right)\right)}\right)}}$$

ex $$10.00611\text{m} = \sqrt{\frac{1660\text{m}^2}{\frac{1}{4}\cdot\left(20+\left(5\cdot\sqrt{3}\right)+\sqrt{5\cdot\left(145+\left(62\cdot\sqrt{5}\right)\right)}\right)}}$$

4) Edge Length of Pentagonal Cupola given Volume

Open Calculator

fx
$$l_e = \left(\frac{V}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right)}\right)^{\frac{1}{3}}$$

ex
$$9.965393\text{m} = \left(\frac{2300\text{m}^3}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right)}\right)^{\frac{1}{3}}$$

Height of Pentagonal Cupola

5) Height of Pentagonal Cupola

Open Calculator

fx
$$h = l_e \cdot \sqrt{1 - \left(\frac{1}{4} \cdot \cos ec\left(\frac{\pi}{5}\right)^2\right)}$$

ex
$$5.257311\text{m} = 10\text{m} \cdot \sqrt{1 - \left(\frac{1}{4} \cdot \cos ec\left(\frac{\pi}{5}\right)^2\right)}$$

6) Height of Pentagonal Cupola given Surface to Volume Ratio

Open Calculator

fx
$$h = \frac{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot R_{A/V}} \cdot \sqrt{1 - \left(\frac{1}{4} \cdot \cos ec\left(\frac{\pi}{5}\right)^2\right)}$$

ex
$$5.357954\text{m} = \frac{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot 0.7\text{m}^{-1}} \cdot \sqrt{1 - \left(\frac{1}{4} \cdot \cos ec\left(\frac{\pi}{5}\right)^2\right)}$$

7) Height of Pentagonal Cupola given Total Surface Area

fx Open Calculator

$$h = \sqrt{\frac{TSA}{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)}} \cdot \sqrt{1 - \left(\frac{1}{4} \cdot \cos ec\left(\frac{\pi}{5}\right)^2\right)}$$

ex
$$5.260521m = \sqrt{\frac{1660m^2}{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)}} \cdot \sqrt{1 - \left(\frac{1}{4} \cdot \cos ec\left(\frac{\pi}{5}\right)^2\right)}$$

8) Height of Pentagonal Cupola given Volume

Open Calculator

fx
$$h = \left(\frac{V}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right)}\right)^{\frac{1}{3}} \cdot \sqrt{1 - \left(\frac{1}{4} \cdot \cos ec\left(\frac{\pi}{5}\right)^2\right)}$$

ex
$$5.239117m = \left(\frac{2300m^3}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right)}\right)^{\frac{1}{3}} \cdot \sqrt{1 - \left(\frac{1}{4} \cdot \cos ec\left(\frac{\pi}{5}\right)^2\right)}$$

Surface Area of Pentagonal Cupola

Total Surface Area of Pentagonal Cupola

9) Total Surface Area of Pentagonal Cupola

Open Calculator

fx
$$TSA = \frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right) \cdot l_e^2$$

ex
$$1657.975m^2 = \frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right) \cdot (10m)^2$$

10) Total Surface Area of Pentagonal Cupola given Height

Open Calculator

fx
$$TSA = \frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right) \cdot \left(\frac{h^2}{1 - \left(\frac{1}{4} \cdot \cos ec\left(\frac{\pi}{5}\right)^2\right)}\right)$$

ex
$$1499.652\text{m}^2 = \frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right) \cdot \left(\frac{(5\text{m})^2}{1 - \left(\frac{1}{4} \cdot \cos ec\left(\frac{\pi}{5}\right)^2\right)}\right)$$

11) Total Surface Area of Pentagonal Cupola given Surface to Volume Ratio

Open Calculator

fx
$$TSA = \frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right) \cdot \Bigg(\frac{\frac{1}{4} \cdot \Big(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \big(}}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right.}$$

ex
$$1722.061\text{m}^2 = \frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right) \cdot \Bigg(\frac{\frac{1}{4} \cdot \Big(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \big(145 + \big(62 \cdot}}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot 0.7\text{m}^{-1}}$$

12) Total Surface Area of Pentagonal Cupola given Volume

Open Calculator

fx
$$TSA = \frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right) \cdot \left(\frac{V}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right)}\right)^{\frac{2}{3}}$$

ex
$$1646.519\text{m}^2 = \frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right) \cdot \left(\frac{2300\text{m}^3}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right)}\right)^{\frac{2}{3}}$$

Surface to Volume Ratio of Pentagonal Cupola

13) Surface to Volume Ratio of Pentagonal Cupola

Open Calculator

fx $$R_{A/V} = \frac{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot l_e}$$

ex $$0.7134\text{m}^{-1} = \frac{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot 10\text{m}}$$

14) Surface to Volume Ratio of Pentagonal Cupola given Height

Open Calculator

fx $$R_{A/V} = \frac{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot \left(\frac{h}{\sqrt{1 - \left(\frac{1}{4} \cdot \cos ec\left(\frac{\pi}{5}\right)^2\right)}}\right)}$$

ex $$0.750114\text{m}^{-1} = \frac{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot \left(\frac{5\text{m}}{\sqrt{1 - \left(\frac{1}{4} \cdot \cos ec\left(\frac{\pi}{5}\right)^2\right)}}\right)}$$

15) Surface to Volume Ratio of Pentagonal Cupola given Total Surface Area

Open Calculator

fx $$R_{A/V} = \frac{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot \sqrt{\frac{TSA}{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)}}}$$

ex $$0.712965\text{m}^{-1} = \frac{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot \sqrt{\frac{1660\text{m}^2}{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)}}}$$

16) Surface to Volume Ratio of Pentagonal Cupola given Volume

Open Calculator

fx $$R_{A/V} = \frac{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot \left(\frac{V}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right)}\right)^{\frac{1}{3}}}$$

ex $$0.715878\text{m}^{-1} = \frac{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot \left(\frac{2300\text{m}^3}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right)}\right)^{\frac{1}{3}}}$$

Volume of Pentagonal Cupola

17) Volume of Pentagonal Cupola

Open Calculator

fx $$V = \frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot l_e^3$$

ex $$2324.045\text{m}^3 = \frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot (10\text{m})^3$$

18) Volume of Pentagonal Cupola given Height

Open Calculator

fx $$V = \frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot \left(\frac{h}{\sqrt{1 - \left(\frac{1}{4} \cdot \cos ec\left(\frac{\pi}{5}\right)^2\right)}}\right)^3$$

ex $$1999.234\text{m}^3 = \frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot \left(\frac{5\text{m}}{\sqrt{1 - \left(\frac{1}{4} \cdot \cos ec\left(\frac{\pi}{5}\right)^2\right)}}\right)^3$$

19) Volume of Pentagonal Cupola given Surface to Volume Ratio

fx Open Calculator

$$V = \frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot \left(\frac{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot R_{A/V}} \right)^{3}$$

ex

$$2460.088\text{m}^3 = \frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot \left(\frac{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)}{\frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot 0.7\text{m}^{-1}} \right)^{3}$$

20) Volume of Pentagonal Cupola given Total Surface Area

fx Open Calculator

$$V = \frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot \left(\frac{TSA}{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)} \right)^{\frac{3}{2}}$$

ex

$$2328.304\text{m}^3 = \frac{1}{6} \cdot \left(5 + \left(4 \cdot \sqrt{5}\right)\right) \cdot \left(\frac{1660\text{m}^2}{\frac{1}{4} \cdot \left(20 + \left(5 \cdot \sqrt{3}\right) + \sqrt{5 \cdot \left(145 + \left(62 \cdot \sqrt{5}\right)\right)}\right)} \right)^{\frac{3}{2}}$$

Variables Used

- **h** Height of Pentagonal Cupola *(Meter)*
- **l_e** Edge Length of Pentagonal Cupola *(Meter)*
- **$R_{A/V}$** Surface to Volume Ratio of Pentagonal Cupola *(1 per Meter)*
- **TSA** Total Surface Area of Pentagonal Cupola *(Square Meter)*
- **V** Volume of Pentagonal Cupola *(Cubic Meter)*

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Function: **cosec**, cosec(Angle)
  Trigonometric cosecant function
- Function: **sec**, sec(Angle)
  Trigonometric secant function
- Function: **sqrt**, sqrt(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
- Measurement: **Reciprocal Length** in 1 per Meter (m^{-1})
  Reciprocal Length Unit Conversion

Check other formula lists

- **Pentagonal Cupola Formulas**
- **Square Cupola Formulas**
- **Triangular Cupola Formulas**

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