Important Truncated Cone Formulas PDF

Formulas
Examples
with Units

List of 29
Important Truncated Cone Formulas

1) Height of Truncated Cone Formulas

1.1) Height of Truncated Cone given Curved Surface Area Formula

Evaluate Formula

Formula

$$h = \sqrt{\left(\frac{CSA}{\pi \cdot \left(r_{Base} + r_{Top}\right)}\right)^2 - \left(r_{Base} - r_{Top}\right)^2}$$

Example with Units

$$7.1245\,\text{m} = \sqrt{\left(\frac{170\,\text{m}^2}{3.1416 \cdot \left(5\,\text{m} + 2\,\text{m}\right)}\right)^2 - \left(5\,\text{m} - 2\,\text{m}\right)^2}$$

1.2) Height of Truncated Cone given Slant Height Formula

Evaluate Formula

Formula

$$h = \sqrt{h_{Slant}^2 - \left(r_{Base} - r_{Top}\right)^2}$$

Example with Units

$$7.4162\,\text{m} = \sqrt{8\,\text{m}^2 - \left(5\,\text{m} - 2\,\text{m}\right)^2}$$

1.3) Height of Truncated Cone given Total Surface Area Formula

Evaluate Formula

Formula

$$h = \sqrt{\left(\frac{TSA - \pi \cdot \left(r_{Base}^2 + r_{Top}^2\right)}{\pi \cdot \left(r_{Base} + r_{Top}\right)}\right)^2 - \left(r_{Base} - r_{Top}\right)^2}$$

Example with Units

$$7.0699\,\text{m} = \sqrt{\left(\frac{260\,\text{m}^2 - 3.1416 \cdot \left(5\,\text{m}^2 + 2\,\text{m}^2\right)}{3.1416 \cdot \left(5\,\text{m} + 2\,\text{m}\right)}\right)^2 - \left(5\,\text{m} - 2\,\text{m}\right)^2}$$

1.4) Height of Truncated Cone given Volume Formula

Evaluate Formula

Formula

$$h = \frac{3 \cdot V}{\pi \cdot \left(r_{Base}^2 + \left(r_{Base} \cdot r_{Top}\right) + r_{Top}^2\right)}$$

Example with Units

$$7.1008\,\text{m} = \frac{3 \cdot 290\,\text{m}^3}{3.1416 \cdot \left(5\,\text{m}^2 + \left(5\,\text{m} \cdot 2\,\text{m}\right) + 2\,\text{m}^2\right)}$$

2) Radius of Truncated Cone Formulas

2.1) Base Radius of Truncated Cone Formulas

2.1.1) Base Radius of Truncated Cone given Base Area Formula

Evaluate Formula

Formula

$$r_{Base} = \sqrt{\frac{A_{Base}}{\pi}}$$

Example with Units

$$5.0463\,\text{m} = \sqrt{\frac{80\,\text{m}^2}{3.1416}}$$

2.1.2) Base Radius of Truncated Cone given Slant Height Formula

Evaluate Formula

Formula

$$r_{Base} = r_{Top} + \sqrt{h_{Slant}^2 - h^2}$$

Example with Units

$$5.873\,m = 2\,m + \sqrt{8\,m^2 - 7\,m^2}$$

2.2) Top Radius of Truncated Cone Formulas

2.2.1) Top Radius of Truncated Cone given Slant Height Formula

Evaluate Formula

Formula

$$r_{Top} = r_{Base} - \sqrt{h_{Slant}^2 - h^2}$$

Example with Units

$$1.127\,m = 5\,m - \sqrt{8\,m^2 - 7\,m^2}$$

2.2.2) Top Radius of Truncated Cone given Top Area Formula

Evaluate Formula

Formula

$$r_{Top} = \sqrt{\frac{A_{Top}}{\pi}}$$

Example with Units

$$1.9544\,m = \sqrt{\frac{12\,m^2}{3.1416}}$$

3) Slant Height of Truncated Cone Formulas

3.1) Slant Height of Truncated Cone Formula

Evaluate Formula

Formula

$$h_{Slant} = \sqrt{\left(r_{Base} - r_{Top}\right)^2 + h^2}$$

Example with Units

$$7.6158\,m = \sqrt{\left(5\,m - 2\,m\right)^2 + 7\,m^2}$$

3.2) Slant Height of Truncated Cone given Curved Surface Area Formula

Evaluate Formula

Formula

$$h_{Slant} = \frac{CSA}{\pi \cdot \left(r_{Base} + r_{Top}\right)}$$

Example with Units

$$7.7304\,m = \frac{170\,m^2}{3.1416 \cdot \left(5\,m + 2\,m\right)}$$

3.3) Slant Height of Truncated Cone given Total Surface Area Formula

Evaluate Formula

Formula

$$h_{Slant} = \frac{TSA - \pi \cdot \left(r_{Base}^2 + r_{Top}^2\right)}{\pi \cdot \left(r_{Base} + r_{Top}\right)}$$

Example with Units

$$7.6801\,m = \frac{260\,m^2 - 3.1416 \cdot \left(5\,m^2 + 2\,m^2\right)}{3.1416 \cdot \left(5\,m + 2\,m\right)}$$

3.4) Slant Height of Truncated Cone given Volume Formula

Evaluate Formula

Formula

$$h_{Slant} = \sqrt{\left(\frac{3 \cdot V}{\pi \cdot \left(r_{Base}^2 + \left(r_{Base} \cdot r_{Top}\right) + r_{Top}^2\right)}\right)^2 + \left(r_{Base} - r_{Top}\right)^2}$$

Example with Units

$$7.7085\,m = \sqrt{\left(\frac{3 \cdot 290\,m^3}{3.1416 \cdot \left(5\,m^2 + \left(5\,m \cdot 2\,m\right) + 2\,m^2\right)}\right)^2 + \left(5\,m - 2\,m\right)^2}$$

4) Surface Area of Truncated Cone Formulas

4.1) Base Area of Truncated Cone Formulas

4.1.1) Base Area of Truncated Cone Formula

Evaluate Formula

Formula

$$A_{Base} = \pi \cdot r_{Base}^2$$

Example with Units

$$78.5398\,m^2 = 3.1416 \cdot 5\,m^2$$

4.2) Curved Surface Area of Truncated Cone Formulas

4.2.1) Curved Surface Area of Truncated Cone Formula

Evaluate Formula

Formula

$$CSA = \pi \cdot \left(r_{Base} + r_{Top} \right) \cdot \sqrt{\left(r_{Base} - r_{Top} \right)^2 + h^2}$$

Example with Units

$$167.4796\,m^2 = 3.1416 \cdot \left(5\,m + 2\,m \right) \cdot \sqrt{\left(5\,m - 2\,m \right)^2 + 7\,m^2}$$

4.2.2) Curved Surface Area of Truncated Cone given Slant Height Formula

Evaluate Formula

Formula

$$CSA = \pi \cdot \left(r_{Base} + r_{Top} \right) \cdot h_{Slant}$$

Example with Units

$$175.9292\,m^2 = 3.1416 \cdot \left(5\,m + 2\,m \right) \cdot 8\,m$$

4.2.3) Curved Surface Area of Truncated Cone given Total Surface Area Formula

Evaluate Formula

Formula

$$CSA = TSA - \pi \cdot \left(r_{Base}^2 + r_{Top}^2 \right)$$

Example with Units

$$168.8938\,m^2 = 260\,m^2 - 3.1416 \cdot \left(5\,m^2 + 2\,m^2 \right)$$

4.2.4) Curved Surface Area of Truncated Cone given Volume Formula

Evaluate Formula

Formula

$$CSA = \pi \cdot \left(r_{Base} + r_{Top} \right) \cdot \sqrt{\left(r_{Base} - r_{Top} \right)^2 + \left(\frac{3 \cdot V}{\pi \cdot \left(r_{Base}^2 + \left(r_{Base} \cdot r_{Top} \right) + r_{Top}^2 \right)} \right)^2}$$

Example with Units

$$169.5185\,m^2 = 3.1416 \cdot \left(5\,m + 2\,m \right) \cdot \sqrt{\left(5\,m - 2\,m \right)^2 + \left(\frac{3 \cdot 290\,m^3}{3.1416 \cdot \left(5\,m^2 + \left(5\,m \cdot 2\,m \right) + 2\,m^2 \right)} \right)^2}$$

4.3) Top Area of Truncated Cone Formulas

4.3.1) Top Area of Truncated Cone Formula

Evaluate Formula

Formula

$$A_{Top} = \pi \cdot r_{Top}^2$$

Example with Units

$$12.5664\,m^2 = 3.1416 \cdot 2\,m^2$$

4.4) Total Surface Area of Truncated Cone Formulas

4.4.1) Total Surface Area of Truncated Cone Formula

Evaluate Formula

Formula

$$TSA = \pi \cdot \left({r_{Base}}^2 + {r_{Top}}^2 + \left(\sqrt{\left(r_{Top} - r_{Base} \right)^2 + h^2} \cdot \left(r_{Base} + r_{Top} \right) \right) \right)$$

Example with Units

$$258.5858\,\text{m}^2 = 3.1416 \cdot \left({5\,\text{m}}^2 + {2\,\text{m}}^2 + \left(\sqrt{\left(2\,\text{m} - 5\,\text{m} \right)^2 + 7\,\text{m}^2} \cdot \left(5\,\text{m} + 2\,\text{m} \right) \right) \right)$$

4.4.2) Total Surface Area of Truncated Cone given Curved Surface Area Formula

Evaluate Formula

Formula

$$TSA = CSA + \pi \cdot \left({r_{Base}}^2 + {r_{Top}}^2 \right)$$

Example with Units

$$261.1062\,\text{m}^2 = 170\,\text{m}^2 + 3.1416 \cdot \left({5\,\text{m}}^2 + {2\,\text{m}}^2 \right)$$

4.4.3) Total Surface Area of Truncated Cone given Slant Height Formula

Evaluate Formula

Formula

$$TSA = \pi \cdot \left({r_{Base}}^2 + {r_{Top}}^2 + \left(h_{Slant} \cdot \left(r_{Base} + r_{Top} \right) \right) \right)$$

Example with Units

$$267.0354\,\text{m}^2 = 3.1416 \cdot \left({5\,\text{m}}^2 + {2\,\text{m}}^2 + \left(8\,\text{m} \cdot \left(5\,\text{m} + 2\,\text{m} \right) \right) \right)$$

4.4.4) Total Surface Area of Truncated Cone given Volume Formula

Evaluate Formula

Formula

$$TSA = \left(\pi \cdot \left(r_{Base} + r_{Top} \right) \cdot \sqrt{\left(\frac{3 \cdot V}{\pi \cdot \left({r_{Base}}^2 + \left(r_{Base} \cdot r_{Top} \right) + {r_{Top}}^2 \right)} \right)^2 + \left(r_{Base} - r_{Top} \right)^2} \right) + \left(\pi \cdot \left({r_{Base}}^2 + {r_{Top}}^2 \right) \right)$$

Example with Units

$$260.6247\,\text{m}^2 = \left(3.1416 \cdot \left(5\,\text{m} + 2\,\text{m} \right) \cdot \sqrt{\left(\frac{3 \cdot 290\,\text{m}^3}{3.1416 \cdot \left({5\,\text{m}}^2 + \left(5\,\text{m} \cdot 2\,\text{m} \right) + {2\,\text{m}}^2 \right)} \right)^2 + \left(5\,\text{m} - 2\,\text{m} \right)^2} \right) + \left(3.1416 \cdot \left({5\,\text{m}}^2 + {2\,\text{m}}^2 \right) \right)$$

5) Surface to Volume Ratio of Truncated Cone Formulas

5.1) Surface to Volume Ratio of Truncated Cone Formula

Evaluate Formula

Formula

$$R_{A/V} = 3 \cdot \frac{{r_{Base}}^2 + {r_{Top}}^2 + \left(\sqrt{\left(r_{Top} - r_{Base} \right)^2 + h^2} \cdot \left(r_{Base} + r_{Top} \right) \right)}{h \cdot \left({r_{Base}}^2 + \left(r_{Base} \cdot r_{Top} \right) + {r_{Top}}^2 \right)}$$

Example with Units

$$0.9045\,\text{m}^{-1} = 3 \cdot \frac{{5\,\text{m}}^2 + {2\,\text{m}}^2 + \left(\sqrt{\left(2\,\text{m} - 5\,\text{m} \right)^2 + 7\,\text{m}^2} \cdot \left(5\,\text{m} + 2\,\text{m} \right) \right)}{7\,\text{m} \cdot \left({5\,\text{m}}^2 + \left(5\,\text{m} \cdot 2\,\text{m} \right) + {2\,\text{m}}^2 \right)}$$

5.2) Surface to Volume Ratio of Truncated Cone given Curved Surface Area Formula

Evaluate Formula

Formula

$$R_{A/V} = \frac{CSA + \pi \cdot \left(r_{Base}^2 + r_{Top}^2 \right)}{\frac{\pi \cdot \left(r_{Base}^2 + \left(r_{Base} \cdot r_{Top} \right) + r_{Top}^2 \right)}{3} \cdot \sqrt{\left(\frac{CSA}{\pi \cdot \left(r_{Base} + r_{Top} \right)} \right)^2 - \left(r_{Base} - r_{Top} \right)^2}}$$

Example with Units

$$0.8974\,\text{m}^{-1} = \frac{170\,\text{m}^2 + 3.1416 \cdot \left(5\,\text{m}^2 + 2\,\text{m}^2 \right)}{\frac{3.1416 \cdot \left(5\,\text{m}^2 + \left(5\,\text{m} \cdot 2\,\text{m} \right) + 2\,\text{m}^2 \right)}{3} \cdot \sqrt{\left(\frac{170\,\text{m}^2}{3.1416 \cdot \left(5\,\text{m} + 2\,\text{m} \right)} \right)^2 - \left(5\,\text{m} - 2\,\text{m} \right)^2}}$$

5.3) Surface to Volume Ratio of Truncated Cone given Slant Height Formula

Evaluate Formula

Formula

$$R_{A/V} = \frac{3 \cdot \left(r_{Base}^2 + r_{Top}^2 + \left(h_{Slant} \cdot \left(r_{Base} + r_{Top} \right) \right) \right)}{\sqrt{h_{Slant}^2 - \left(r_{Base} - r_{Top} \right)^2} \cdot \left(r_{Base}^2 + \left(r_{Base} \cdot r_{Top} \right) + r_{Top}^2 \right)}$$

Example with Units

$$0.8816\,\text{m}^{-1} = \frac{3 \cdot \left(5\,\text{m}^2 + 2\,\text{m}^2 + \left(8\,\text{m} \cdot \left(5\,\text{m} + 2\,\text{m} \right) \right) \right)}{\sqrt{8\,\text{m}^2 - \left(5\,\text{m} - 2\,\text{m} \right)^2} \cdot \left(5\,\text{m}^2 + \left(5\,\text{m} \cdot 2\,\text{m} \right) + 2\,\text{m}^2 \right)}$$

6) Volume of Truncated Cone Formulas

6.1) Volume of Truncated Cone Formula

Evaluate Formula

Formula

$$V = \frac{\pi}{3} \cdot h \cdot \left(r_{Base}^2 + \left(r_{Base} \cdot r_{Top} \right) + r_{Top}^2 \right)$$

Example with Units

$$285.8849\,\text{m}^3 = \frac{3.1416}{3} \cdot 7\,\text{m} \cdot \left(5\,\text{m}^2 + \left(5\,\text{m} \cdot 2\,\text{m} \right) + 2\,\text{m}^2 \right)$$

6.2) Volume of Truncated Cone given Curved Surface Area Formula

Evaluate Formula

Formula

$$V = \frac{\pi}{3} \cdot \left(r_{Base}^2 + \left(r_{Base} \cdot r_{Top} \right) + r_{Top}^2 \right) \cdot \sqrt{\left(\frac{CSA}{\pi \cdot \left(r_{Base} + r_{Top} \right)} \right)^2 - \left(r_{Base} - r_{Top} \right)^2}$$

Example with Units

$$290.9705\,\text{m}^3 = \frac{3.1416}{3} \cdot \left(5\,\text{m}^2 + \left(5\,\text{m} \cdot 2\,\text{m} \right) + 2\,\text{m}^2 \right) \cdot \sqrt{\left(\frac{170\,\text{m}^2}{3.1416 \cdot \left(5\,\text{m} + 2\,\text{m} \right)} \right)^2 - \left(5\,\text{m} - 2\,\text{m} \right)^2}$$

6.3) Volume of Truncated Cone given Slant Height Formula

Evaluate Formula

Formula

$$V = \frac{\pi}{3} \cdot \left(r_{Base}^2 + \left(r_{Base} \cdot r_{Top} \right) + r_{Top}^2 \right) \cdot \sqrt{h_{Slant}^2 - \left(r_{Base} - r_{Top} \right)^2}$$

Example with Units

$$302.8828\,\text{m}^3 = \frac{3.1416}{3} \cdot \left(5\,\text{m}^2 + \left(5\,\text{m} \cdot 2\,\text{m} \right) + 2\,\text{m}^2 \right) \cdot \sqrt{8\,\text{m}^2 - \left(5\,\text{m} - 2\,\text{m} \right)^2}$$

6.4) Volume of Truncated Cone given Total Surface Area Formula

Evaluate Formula

Formula

$$V = \frac{\pi}{3} \cdot \left(r_{Base}^{2} + \left(r_{Base} \cdot r_{Top} \right) + r_{Top}^{2} \right) \cdot \sqrt{\left(\frac{TSA - \pi \cdot \left(r_{Base}^{2} + r_{Top}^{2} \right)}{\pi \cdot \left(r_{Base} + r_{Top} \right)} \right)^{2} - \left(r_{Base} - r_{Top} \right)^{2}}$$

Example with Units

$$288.7402\,\text{m}^3 = \frac{3.1416}{3} \cdot \left(5\,\text{m}^{2} + \left(5\,\text{m} \cdot 2\,\text{m} \right) + 2\,\text{m}^{2} \right) \cdot \sqrt{\left(\frac{260\,\text{m}^2 - 3.1416 \cdot \left(5\,\text{m}^{2} + 2\,\text{m}^{2} \right)}{3.1416 \cdot \left(5\,\text{m} + 2\,\text{m} \right)} \right)^{2} - \left(5\,\text{m} - 2\,\text{m} \right)^{2}}$$

Variables used in list of Truncated Cone Formulas above

- A_{Base} Base Area of Truncated Cone *(Square Meter)*
- A_{Top} Top Area of Truncated Cone *(Square Meter)*
- **CSA** Curved Surface Area of Truncated Cone *(Square Meter)*
- **h** Height of Truncated Cone *(Meter)*
- h_{Slant} Slant Height of Truncated Cone *(Meter)*
- $R_{A/V}$ Surface to Volume Ratio of Truncated Cone *(1 per Meter)*
- r_{Base} Base Radius of Truncated Cone *(Meter)*
- r_{Top} Top Radius of Truncated Cone *(Meter)*
- **TSA** Total Surface Area of Truncated Cone *(Square Meter)*
- **V** Volume of Truncated Cone *(Cubic Meter)*

Constants, Functions, Measurements used in list of Truncated Cone Formulas above

- constant(s): **pi**, 3.14159265358979323846264338327950288 *Archimedes' constant*
- 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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