Important Formulas of Regular Square Pyramid PDF

Formulas
Examples
with Units

List of 20
Important Formulas of Regular Square Pyramid

1) Base Angle of Square Pyramid Formula

Evaluate Formula

Formula

$$\angle_{Base} = \arccos\left(\frac{\left(\frac{l_{e(Base)}}{2}\right)^2 + h_{slant}^2 - h^2}{l_{e(Base)} \cdot h_{slant}}\right)$$

Example with Units

$$69.5127° = \arccos\left(\frac{\left(\frac{10\,m}{2}\right)^2 + 16\,m^2 - 15\,m^2}{10\,m \cdot 16\,m}\right)$$

2) Base Area of Square Pyramid Formula

Evaluate Formula

Formula

$$A_{Base} = l_{e(Base)}^2$$

Example with Units

$$100\,m^2 = 10\,m^2$$

3) Edge Length of Base of Square Pyramid given Lateral Edge Length Formula

Evaluate Formula

Formula

$$l_{e(Base)} = \sqrt{2 \cdot \left(l_{e(Lateral)}^2 - h^2\right)}$$

Example with Units

$$11.3137\,m = \sqrt{2 \cdot \left(17\,m^2 - 15\,m^2\right)}$$

4) Edge Length of Base of Square Pyramid given Slant Height Formula

Evaluate Formula

Formula

$$l_{e(Base)} = 2 \cdot \sqrt{h_{slant}^2 - h^2}$$

Example with Units

$$11.1355\,m = 2 \cdot \sqrt{16\,m^2 - 15\,m^2}$$

5) Height of Square Pyramid given Base Angle Formula

Evaluate Formula

Formula

$$h = \sqrt{\left(\frac{l_{e(Base)}}{4}\right)^2 + h_{slant}^2 - \left(l_{e(Base)} \cdot h_{slant} \cdot \cos\left(\angle_{Base}\right)\right)}$$

Example with Units

$$15.0425\,\text{m} = \sqrt{\left(\frac{10\,\text{m}}{4}\right)^2 + 16\,\text{m}^2 - \left(10\,\text{m} \cdot 16\,\text{m} \cdot \cos\left(70°\right)\right)}$$

6) Height of Square Pyramid given Lateral Edge Length Formula

Evaluate Formula

Formula

$$h = \sqrt{l_{e(Lateral)}^2 - \left(\frac{l_{e(Base)}}{2}\right)^2}$$

Example with Units

$$15.4596\,\text{m} = \sqrt{17\,\text{m}^2 - \left(\frac{10\,\text{m}}{2}\right)^2}$$

7) Height of Square Pyramid given Volume Formula

Evaluate Formula

Formula

$$h = \frac{3 \cdot V}{l_{e(Base)}^2}$$

Example with Units

$$15\,\text{m} = \frac{3 \cdot 500\,\text{m}^3}{10\,\text{m}^2}$$

8) Lateral Edge Length of Square Pyramid Formula

Evaluate Formula

Formula

$$l_{e(Lateral)} = \sqrt{\left(\frac{l_{e(Base)}}{2}\right)^2 + h^2}$$

Example with Units

$$16.5831\,\text{m} = \sqrt{\left(\frac{10\,\text{m}}{2}\right)^2 + 15\,\text{m}^2}$$

9) Lateral Edge Length of Square Pyramid given Base Angle Formula

Evaluate Formula

Formula

$$l_{e(Lateral)} = \sqrt{\left(\frac{3 \cdot l_{e(Base)}}{4}\right)^2 + h_{slant}^2 - \left(l_{e(Base)} \cdot h_{slant} \cdot \cos\left(\angle_{Base}\right)\right)}$$

Example with Units

$$16.6216\,\text{m} = \sqrt{\left(\frac{3 \cdot 10\,\text{m}}{4}\right)^2 + 16\,\text{m}^2 - \left(10\,\text{m} \cdot 16\,\text{m} \cdot \cos\left(70°\right)\right)}$$

10) Lateral Edge Length of Square Pyramid given Volume and Height Formula

Evaluate Formula

Formula

$$l_{e(Lateral)} = \sqrt{h^2 + \left(\frac{3}{2} \cdot \frac{V}{h}\right)}$$

Example with Units

$$16.5831\,\text{m} = \sqrt{15\,\text{m}^2 + \left(\frac{3}{2} \cdot \frac{500\,\text{m}^3}{15\,\text{m}}\right)}$$

11) Lateral Surface Area of Square Pyramid Formula

Evaluate Formula

Formula

$$LSA = 2 \cdot l_{e(Base)} \cdot \sqrt{\left(\frac{l_{e(Base)}}{4}\right)^2 + h^2}$$

Example with Units

$$316.2278\,\text{m}^2 = 2 \cdot 10\,\text{m} \cdot \sqrt{\left(\frac{10\,\text{m}}{4}\right)^2 + 15\,\text{m}^2}$$

12) Lateral Surface Area of Square Pyramid given Slant Height Formula

Evaluate Formula

Formula

$$LSA = 2 \cdot l_{e(Base)} \cdot h_{slant}$$

Example with Units

$$320\,\text{m}^2 = 2 \cdot 10\,\text{m} \cdot 16\,\text{m}$$

13) Slant Height of Square Pyramid Formula

Evaluate Formula

Formula

$$h_{slant} = \sqrt{\left(\frac{l_{e(Base)}}{4}\right)^2 + h^2}$$

Example with Units

$$15.8114\,\text{m} = \sqrt{\left(\frac{10\,\text{m}}{4}\right)^2 + 15\,\text{m}^2}$$

14) Slant Height of Square Pyramid given Total Surface Area Formula

Evaluate Formula

Formula

$$h_{slant} = \sqrt{\left(\frac{l_{e(Base)}}{4}\right)^2 + \frac{\left(\frac{TSA - l_{e(Base)}^2}{l_{e(Base)}}\right)^2 - l_{e(Base)}^2}{4}}$$

Example with Units

$$16\,\text{m} = \sqrt{\left(\frac{10\,\text{m}}{4}\right)^2 + \frac{\left(\frac{420\,\text{m}^2 - 10\,\text{m}^2}{10\,\text{m}}\right)^2 - 10\,\text{m}^2}{4}}$$

15) Surface to Volume Ratio of Square Pyramid Formula

Evaluate Formula

Formula

$$R_{A/V} = \frac{l_{e(Base)}^2 + \left(l_{e(Base)} \cdot \sqrt{\left(4 \cdot h^2\right) + l_{e(Base)}^2}\right)}{\frac{1}{3} \cdot l_{e(Base)}^2 \cdot h}$$

Example with Units

$$0.8325\,\text{m}^{-1} = \frac{10\,\text{m}^2 + \left(10\,\text{m} \cdot \sqrt{\left(4 \cdot 15\,\text{m}^2\right) + 10\,\text{m}^2}\right)}{\frac{1}{3} \cdot 10\,\text{m}^2 \cdot 15\,\text{m}}$$

16) Surface to Volume Ratio of Square Pyramid given Lateral Edge Length and Height Formula

Evaluate Formula

Formula

$$R_{A/V} = \frac{\left(2 \cdot \left(l_{e(Lateral)}^2 - h^2\right)\right) + \left(\sqrt{2 \cdot \left(l_{e(Lateral)}^2 - h^2\right)} \cdot \sqrt{2 \cdot \left(l_{e(Lateral)}^2 + h^2\right)}\right)}{\frac{1}{3} \cdot h \cdot \left(2 \cdot \left(l_{e(Lateral)}^2 - h^2\right)\right)}$$

Example with Units

$$0.7668\,\text{m}^{-1} = \frac{\left(2 \cdot \left(17\,\text{m}^2 - 15\,\text{m}^2\right)\right) + \left(\sqrt{2 \cdot \left(17\,\text{m}^2 - 15\,\text{m}^2\right)} \cdot \sqrt{2 \cdot \left(17\,\text{m}^2 + 15\,\text{m}^2\right)}\right)}{\frac{1}{3} \cdot 15\,\text{m} \cdot \left(2 \cdot \left(17\,\text{m}^2 - 15\,\text{m}^2\right)\right)}$$

17) Total Surface Area of Square Pyramid Formula

Evaluate Formula

Formula

$$TSA = l_{e(Base)}^2 + \left(l_{e(Base)} \cdot \sqrt{\left(4 \cdot h^2\right) + l_{e(Base)}^2}\right)$$

Example with Units

$$416.2278\,\text{m}^2 = 10\,\text{m}^2 + \left(10\,\text{m} \cdot \sqrt{\left(4 \cdot 15\,\text{m}^2\right) + 10\,\text{m}^2}\right)$$

18) Total Surface Area of Square Pyramid given Slant Height Formula

Evaluate Formula

Formula

$$TSA = \left(2 \cdot l_{e(Base)} \cdot h_{slant}\right) + l_{e(Base)}^2$$

Example with Units

$$420\,\text{m}^2 = \left(2 \cdot 10\,\text{m} \cdot 16\,\text{m}\right) + 10\,\text{m}^2$$

19) Volume of Square Pyramid Formula

Evaluate Formula

Formula

$$V = \frac{l_{e(Base)}^2 \cdot h}{3}$$

Example with Units

$$500\,\text{m}^3 = \frac{10\,\text{m}^2 \cdot 15\,\text{m}}{3}$$

20) Volume of Square Pyramid given Slant Height Formula

Evaluate Formula

Formula

$$V = \frac{1}{3} \cdot l_{e(Base)}^2 \cdot \sqrt{h_{slant}^2 - \frac{l_{e(Base)}^2}{4}}$$

Example with Units

$$506.6228\,\text{m}^3 = \frac{1}{3} \cdot 10\,\text{m}^2 \cdot \sqrt{16\,\text{m}^2 - \frac{10\,\text{m}^2}{4}}$$

Variables used in list of Important Formulas of Regular Square Pyramid above

- $\angle_{Base}$ Base Angle of Square Pyramid *(Degree)*
- A_{Base} Base Area of Square Pyramid *(Square Meter)*
- **h** Height of Square Pyramid *(Meter)*
- h_{slant} Slant Height of Square Pyramid *(Meter)*
- $l_{e(Base)}$ Edge Length of Base of Square Pyramid *(Meter)*
- $l_{e(Lateral)}$ Lateral Edge Length of Square Pyramid *(Meter)*
- **LSA** Lateral Surface Area of Square Pyramid *(Square Meter)*
- $R_{A/V}$ Surface to Volume Ratio of Square Pyramid *(1 per Meter)*
- **TSA** Total Surface Area of Square Pyramid *(Square Meter)*
- **V** Volume of Square Pyramid *(Cubic Meter)*

Constants, Functions, Measurements used in list of Important Formulas of Regular Square Pyramid above

- Functions: **arccos**, arccos(Number)
  Arccosine function, is the inverse function of the cosine function.It is the function that takes a ratio as an input and returns the angle whose cosine is equal to that ratio.
- Functions: **cos**, cos(Angle)
  Cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse of the triangle.
- 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: **Angle** in Degree (°)
  Angle Unit Conversion
- Measurement: **Reciprocal Length** in 1 per Meter (m^{-1})
  Reciprocal Length Unit Conversion

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