# Important Formulas of Octahedron PDF

**Formulas**

**Examples**

**with Units**

## List of 24
### Important Formulas of Octahedron

## 1) Edge Length of Octahedron Formulas 

### 1.1) Edge Length of Octahedron given Insphere Radius Formula 

Evaluate Formula 

**Formula**

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

**Example with Units**

$$9.798\,m = \sqrt{6} \cdot 4\,m$$

### 1.2) Edge Length of Octahedron given Midsphere Radius Formula 

Evaluate Formula 

**Formula**

$$l_e = 2 \cdot r_m$$

**Example with Units**

$$10\,m = 2 \cdot 5\,m$$

### 1.3) Edge Length of Octahedron given Space Diagonal Formula 

Evaluate Formula 

**Formula**

$$l_e = \frac{d_{Space}}{\sqrt{2}}$$

**Example with Units**

$$9.8995\,m = \frac{14\,m}{\sqrt{2}}$$

## 2) Radius of Octahedron Formulas 

### 2.1) Circumsphere Radius of Octahedron Formula 

Evaluate Formula 

**Formula**

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

**Example with Units**

$$7.0711\,m = \frac{10\,m}{\sqrt{2}}$$

### 2.2) Circumsphere Radius of Octahedron given Insphere Radius Formula 

Evaluate Formula 

**Formula**

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

**Example with Units**

$$6.9282\,m = \sqrt{3} \cdot 4\,m$$

### 2.3) Circumsphere Radius of Octahedron given Space Diagonal Formula 

Evaluate Formula 

**Formula**

$$r_c = \frac{d_{Space}}{2}$$

**Example with Units**

$$7\,m = \frac{14\,m}{2}$$

## 2.4) Insphere Radius of Octahedron Formula 📤

**Formula**

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

**Example with Units**

$$4.0825\,\text{m} = \frac{10\,\text{m}}{\sqrt{6}}$$

## 2.5) Insphere Radius of Octahedron given Midsphere Radius Formula 📤

**Formula**

$$r_i = \sqrt{\frac{2}{3}} \cdot r_m$$

**Example with Units**

$$4.0825\,\text{m} = \sqrt{\frac{2}{3}} \cdot 5\,\text{m}$$

## 2.6) Insphere Radius of Octahedron given Total Surface Area Formula 📤

**Formula**

$$r_i = \frac{\sqrt{\frac{TSA}{2 \cdot \sqrt{3}}}}{\sqrt{6}}$$

**Example with Units**

$$4.1036\,\text{m} = \frac{\sqrt{\frac{350\,\text{m}^2}{2 \cdot \sqrt{3}}}}{\sqrt{6}}$$

## 2.7) Midsphere Radius of Octahedron Formula 📤

**Formula**

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

**Example with Units**

$$5\,\text{m} = \frac{10\,\text{m}}{2}$$

## 2.8) Midsphere Radius of Octahedron given Insphere Radius Formula 📤

**Formula**

$$r_m = \sqrt{\frac{3}{2}} \cdot r_i$$

**Example with Units**

$$4.899\,\text{m} = \sqrt{\frac{3}{2}} \cdot 4\,\text{m}$$

## 2.9) Midsphere Radius of Octahedron given Space Diagonal Formula 📤

**Formula**

$$r_m = \frac{d_{Space}}{2 \cdot \sqrt{2}}$$

**Example with Units**

$$4.9497\,\text{m} = \frac{14\,\text{m}}{2 \cdot \sqrt{2}}$$

# 3) Space Diagonal of Octahedron Formulas 📤

## 3.1) Space Diagonal of Octahedron Formula 📤

**Formula**

$$d_{Space} = \sqrt{2} \cdot l_e$$

**Example with Units**

$$14.1421\,\text{m} = \sqrt{2} \cdot 10\,\text{m}$$

### 3.2) Space Diagonal of Octahedron given Insphere Radius Formula 

| Formula | Example with Units |
|---|---|
| $d_{Space} = 2 \cdot \sqrt{3} \cdot r_i$ | $13.8564\,m = 2 \cdot \sqrt{3} \cdot 4\,m$ |

Evaluate Formula 

### 3.3) Space Diagonal of Octahedron given Midsphere Radius Formula 

| Formula | Example with Units |
|---|---|
| $d_{Space} = 2 \cdot \sqrt{2} \cdot r_m$ | $14.1421\,m = 2 \cdot \sqrt{2} \cdot 5\,m$ |

Evaluate Formula 

### 3.4) Space Diagonal of Octahedron given Volume Formula 

| Formula | Example with Units |
|---|---|
| $d_{Space} = \sqrt{2} \cdot \left( \dfrac{3 \cdot V}{\sqrt{2}} \right)^{\frac{1}{3}}$ | $14.1281\,m = \sqrt{2} \cdot \left( \dfrac{3 \cdot 470\,m^3}{\sqrt{2}} \right)^{\frac{1}{3}}$ |

Evaluate Formula 

# 4) Total Surface Area of Octahedron Formulas 

### 4.1) Total Surface Area of Octahedron Formula 

| Formula | Example with Units |
|---|---|
| $TSA = 2 \cdot \sqrt{3} \cdot l_e^{\,2}$ | $346.4102\,m^2 = 2 \cdot \sqrt{3} \cdot 10\,m^2$ |

Evaluate Formula 

### 4.2) Total Surface Area of Octahedron given Circumsphere Radius Formula 

| Formula | Example with Units |
|---|---|
| $TSA = 4 \cdot \sqrt{3} \cdot r_c^{\,2}$ | $339.482\,m^2 = 4 \cdot \sqrt{3} \cdot 7\,m^2$ |

Evaluate Formula 

### 4.3) Total Surface Area of Octahedron given Midsphere Radius Formula 

| Formula | Example with Units |
|---|---|
| $TSA = 8 \cdot \sqrt{3} \cdot r_m^{\,2}$ | $346.4102\,m^2 = 8 \cdot \sqrt{3} \cdot 5\,m^2$ |

Evaluate Formula 

### 4.4) Total Surface Area of Octahedron given Space Diagonal Formula 

| Formula | Example with Units |
|---|---|
| $TSA = \sqrt{3} \cdot d_{Space}^{\,2}$ | $339.482\,m^2 = \sqrt{3} \cdot 14\,m^2$ |

Evaluate Formula 

# 5) Volume of Octahedron Formulas 

### 5.1) Volume of Octahedron Formula 

| Formula | Example with Units |
|---|---|
| $V = \dfrac{\sqrt{2}}{3} \cdot l_e^{\,3}$ | $471.4045\,m^3 = \dfrac{\sqrt{2}}{3} \cdot 10\,m^3$ |

Evaluate Formula

## 5.2) Volume of Octahedron given Circumsphere Radius Formula 

**Formula**

$$V = \frac{4 \cdot r_c^{\ 3}}{3}$$

**Example with Units**

$$457.3333 \,_{m^3} = \frac{4 \cdot 7_m^{\ 3}}{3}$$

## 5.3) Volume of Octahedron given Insphere Radius Formula 

**Formula**

$$V = 4 \cdot \sqrt{3} \cdot r_i^{\ 3}$$

**Example with Units**

$$443.405 \,_{m^3} = 4 \cdot \sqrt{3} \cdot 4_m^{\ 3}$$

## 5.4) Volume of Octahedron given Total Surface Area Formula 

**Formula**

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

**Example with Units**

$$478.7512 \,_{m^3} = \frac{\sqrt{2}}{3} \cdot \left( \sqrt{\frac{350 \,_{m^2}}{2 \cdot \sqrt{3}}} \right)^3$$

## Variables used in list of Important Formulas of Octahedron above

- **d$_{Space}$** Space Diagonal of Octahedron *(Meter)*
- **l$_e$** Edge Length of Octahedron *(Meter)*
- **r$_c$** Circumsphere Radius of Octahedron *(Meter)*
- **r$_i$** Insphere Radius of Octahedron *(Meter)*
- **r$_m$** Midsphere Radius of Octahedron *(Meter)*
- **TSA** Total Surface Area of Octahedron *(Square Meter)*
- **V** Volume of Octahedron *(Cubic Meter)*

## Constants, Functions, Measurements used in list of Important Formulas of Octahedron 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 (m³)
  *Volume Unit Conversion* 
- Measurement: **Area** in Square Meter (m²)
  *Area Unit Conversion*

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