



1) Height of Ingot Formulas

1.1) Height of Ingot given Skewed Edge Length Formula

[Evaluate Formula](#)

Formula

$$h = \sqrt{l_{e(\text{Skewed})}^2 - \frac{(l_{\text{Large Rectangle}} - l_{\text{Small Rectangle}})^2}{4} - \frac{(w_{\text{Large Rectangle}} - w_{\text{Small Rectangle}})^2}{4}}$$

Example with Units

$$39.5948 \text{ m} = \sqrt{43 \text{ m}^2 - \frac{(50 \text{ m} - 20 \text{ m})^2}{4} - \frac{(25 \text{ m} - 10 \text{ m})^2}{4}}$$

1.2) Height of Ingot given Slant Height at Rectangular Lengths Formula

[Evaluate Formula](#)

Formula

$$h = \sqrt{h_{\text{Slant(Length)}}^2 - \frac{(w_{\text{Large Rectangle}} - w_{\text{Small Rectangle}})^2}{4}}$$

Example with Units

$$40.3082 \text{ m} = \sqrt{41 \text{ m}^2 - \frac{(25 \text{ m} - 10 \text{ m})^2}{4}}$$

1.3) Height of Ingot given Slant Height at Rectangular Widths Formula

[Evaluate Formula](#)

Formula

$$h = \sqrt{h_{\text{Slant(Width)}}^2 - \frac{(l_{\text{Large Rectangle}} - l_{\text{Small Rectangle}})^2}{4}}$$

Example with Units

$$39.2301 \text{ m} = \sqrt{42 \text{ m}^2 - \frac{(50 \text{ m} - 20 \text{ m})^2}{4}}$$

1.4) Height of Ingot given Space Diagonal Formula

[Evaluate Formula](#)

Formula

$$h = \sqrt{d_{\text{Space}}^2 - \frac{(l_{\text{Large Rectangle}} + l_{\text{Small Rectangle}})^2}{4} - \frac{(w_{\text{Large Rectangle}} + w_{\text{Small Rectangle}})^2}{4}}$$

Example with Units

$$40.0593 \text{ m} = \sqrt{56 \text{ m}^2 - \frac{(50 \text{ m} + 20 \text{ m})^2}{4} - \frac{(25 \text{ m} + 10 \text{ m})^2}{4}}$$

2) Length of Ingot Formulas

2.1) Larger Rectangular Length of Ingot given Length to Width Ratio of Rectangles Formula

[Evaluate Formula](#)

Formula

$$l_{\text{Large Rectangle}} = R_{l/w} \cdot w_{\text{Large Rectangle}}$$

Example with Units

$$50 \text{ m} = 2 \cdot 25 \text{ m}$$

2.2) Skewed Edge Length of Ingot Formula

[Evaluate Formula](#)

Formula

$$l_{e(\text{Skewed})} = \sqrt{h^2 + \frac{(l_{\text{Large Rectangle}} - l_{\text{Small Rectangle}})^2}{4} + \frac{(w_{\text{Large Rectangle}} - w_{\text{Small Rectangle}})^2}{4}}$$

Example with Units

$$43.3734 \text{ m} = \sqrt{40 \text{ m}^2 + \frac{(50 \text{ m} - 20 \text{ m})^2}{4} + \frac{(25 \text{ m} - 10 \text{ m})^2}{4}}$$



2.3) Smaller Rectangular Length of Ingot given Length to Width Ratio of Rectangles Formula

Formula

$$l_{\text{Small Rectangle}} = R_{l/w} \cdot w_{\text{Small Rectangle}}$$

Example with Units

$$20 \text{ m} = 2 \cdot 10 \text{ m}$$

Evaluate Formula 

3) Slant Height of Ingot Formulas

3.1) Slant Height at Rectangular Lengths of Ingot Formula

Formula

$$h_{\text{Slant(Length)}} = \sqrt{h^2 + \frac{(w_{\text{Large Rectangle}} - w_{\text{Small Rectangle}})^2}{4}}$$

Example with Units

$$40.6971 \text{ m} = \sqrt{40 \text{ m}^2 + \frac{(25 \text{ m} - 10 \text{ m})^2}{4}}$$

Evaluate Formula 

3.2) Slant Height at Rectangular Widths of Ingot Formula

Formula

$$h_{\text{Slant(Width)}} = \sqrt{h^2 + \frac{(l_{\text{Large Rectangle}} - l_{\text{Small Rectangle}})^2}{4}}$$

Example with Units

$$42.72 \text{ m} = \sqrt{40 \text{ m}^2 + \frac{(50 \text{ m} - 20 \text{ m})^2}{4}}$$

Evaluate Formula 

4) Space Diagonal of Ingot Formulas

4.1) Space Diagonal of Ingot Formula

Formula

$$d_{\text{Space}} = \sqrt{h^2 + \frac{(l_{\text{Large Rectangle}} + l_{\text{Small Rectangle}})^2}{4} + \frac{(w_{\text{Large Rectangle}} + w_{\text{Small Rectangle}})^2}{4}}$$

Example with Units

$$55.9576 \text{ m} = \sqrt{40 \text{ m}^2 + \frac{(50 \text{ m} + 20 \text{ m})^2}{4} + \frac{(25 \text{ m} + 10 \text{ m})^2}{4}}$$

Evaluate Formula 

5) Surface Area of Ingot Formulas

5.1) Total Surface Area of Ingot Formulas

5.1.1) Total Surface Area of Ingot Formula

Formula

$$TSA = (l_{\text{Large Rectangle}} \cdot w_{\text{Large Rectangle}}) + (l_{\text{Small Rectangle}} \cdot w_{\text{Small Rectangle}}) + (h_{\text{Slant(Length)}} \cdot (l_{\text{Large Rectangle}} + l_{\text{Small Rectangle}})) + (h_{\text{Slant(Width)}} \cdot (w_{\text{Large Rectangle}} + w_{\text{Small Rectangle}}))$$

Example with Units

$$5790 \text{ m}^2 = (50 \text{ m} \cdot 25 \text{ m}) + (20 \text{ m} \cdot 10 \text{ m}) + (41 \text{ m} \cdot (50 \text{ m} + 20 \text{ m})) + (42 \text{ m} \cdot (25 \text{ m} + 10 \text{ m}))$$

Evaluate Formula 

5.1.2) Total Surface Area of Ingot given Height Formula

Formula

$$TSA = (l_{\text{Large Rectangle}} \cdot w_{\text{Large Rectangle}}) + (l_{\text{Small Rectangle}} \cdot w_{\text{Small Rectangle}}) + \left(\sqrt{h^2 + \frac{(w_{\text{Large Rectangle}} - w_{\text{Small Rectangle}})^2}{4}} \cdot (l_{\text{Large Rectangle}} + l_{\text{Small Rectangle}}) \right) + \left(\sqrt{h^2 + \frac{(l_{\text{Large Rectangle}} - l_{\text{Small Rectangle}})^2}{4}} \cdot (w_{\text{Large Rectangle}} + w_{\text{Small Rectangle}}) \right)$$

Example with Units

$$5793.9943 \text{ m}^2 = (50 \text{ m} \cdot 25 \text{ m}) + (20 \text{ m} \cdot 10 \text{ m}) + \left(\sqrt{40 \text{ m}^2 + \frac{(25 \text{ m} - 10 \text{ m})^2}{4}} \cdot (50 \text{ m} + 20 \text{ m}) \right) + \left(\sqrt{40 \text{ m}^2 + \frac{(50 \text{ m} - 20 \text{ m})^2}{4}} \cdot (25 \text{ m} + 10 \text{ m}) \right)$$

Evaluate Formula 

6) Surface to Volume Ratio and Length to Width Ratio of Rectangles Formulas

6.1) Length to Width Ratio of Ingot Formula

Formula

$$R_{l/w} = \frac{l_{\text{Large Rectangle}}}{w_{\text{Large Rectangle}}}$$

Example with Units

$$2 = \frac{50 \text{ m}}{25 \text{ m}}$$

Evaluate Formula 



6.2) Surface to Volume Ratio of Ingot Formula

[Evaluate Formula !\[\]\(1d3a1175dd4902218e694b9c098adb83_img.jpg\)](#)

Formula

$$R_{A/V} = \frac{\left(l_{\text{Large Rectangle}} \cdot w_{\text{Large Rectangle}} \right) + \left(l_{\text{Small Rectangle}} \cdot w_{\text{Small Rectangle}} \right) + \left(h_{\text{Slant(Length)}} \cdot \left(l_{\text{Large Rectangle}} + l_{\text{Small Rectangle}} \right) \right) + \left(h_{\text{Slant(Length)}} \cdot \left(l_{\text{Large Rectangle}} + l_{\text{Small Rectangle}} \right) \cdot \frac{h}{2} \right) + \left(l_{\text{Small Rectangle}} \cdot w_{\text{Small Rectangle}} \cdot h \right) + \left(l_{\text{Small Rectangle}} \cdot \left(w_{\text{Large Rectangle}} - w_{\text{Small Rectangle}} \right) \cdot \frac{h}{2} \right) + \left(w_{\text{Small Rectangle}} \cdot \left(l_{\text{Large Rectangle}} - l_{\text{Small Rectangle}} \right) \cdot \frac{h}{2} \right) + \left(w_{\text{Small Rectangle}} \cdot h \right)}{V}$$

Example with Units

$$0.2227 \text{ m}^{-1} = \frac{\left(50 \text{ m} \cdot 25 \text{ m} \right) + \left(20 \text{ m} \cdot 10 \text{ m} \right) + \left(41 \text{ m} \cdot \left(50 \text{ m} + 20 \text{ m} \right) \right) + \left(42 \text{ m} \cdot \left(25 \text{ m} + 10 \text{ m} \right) \right) + \left(40 \text{ m} \cdot 25 \text{ m} \cdot 20 \text{ m} \cdot 10 \text{ m} \right) + \left(20 \text{ m} \cdot 10 \text{ m} \cdot 40 \text{ m} \right) + \left(20 \text{ m} \cdot \left(25 \text{ m} - 10 \text{ m} \right) \cdot \frac{40 \text{ m}}{2} \right) + \left(10 \text{ m} \cdot \left(50 \text{ m} - 20 \text{ m} \right) \cdot \frac{40 \text{ m}}{2} \right) + \left(\left(50 \text{ m} - 20 \text{ m} \right) \cdot \left(25 \text{ m} - 10 \text{ m} \right) \cdot \frac{40 \text{ m}}{3} \right)}{\left(26000 \text{ m}^3 \right)}$$

7) Volume of Ingot Formulas

7.1) Volume of Ingot Formula

[Evaluate Formula !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

Formula

$$V = \frac{h}{3} \cdot \left(\left(l_{\text{Large Rectangle}} \cdot w_{\text{Large Rectangle}} \right) + \sqrt{l_{\text{Large Rectangle}} \cdot w_{\text{Large Rectangle}} \cdot l_{\text{Small Rectangle}} \cdot w_{\text{Small Rectangle}}} + \left(l_{\text{Small Rectangle}} \cdot w_{\text{Small Rectangle}} \right) \right)$$

Example with Units

$$26000 \text{ m}^3 = \frac{40 \text{ m}}{3} \cdot \left(\left(50 \text{ m} \cdot 25 \text{ m} \right) + \sqrt{50 \text{ m} \cdot 25 \text{ m} \cdot 20 \text{ m} \cdot 10 \text{ m}} + \left(20 \text{ m} \cdot 10 \text{ m} \right) \right)$$

7.2) Volume of Ingot given Skewed Edge Length Formula

[Evaluate Formula !\[\]\(7d1d6890825e83a6a4a51febe2dcc7f3_img.jpg\)](#)

Formula

$$V = \sqrt{\frac{l_{\text{e(Skewed)}}^2 - \frac{\left(l_{\text{Large Rectangle}} - l_{\text{Small Rectangle}} \right)^2}{4} - \frac{\left(w_{\text{Large Rectangle}} - w_{\text{Small Rectangle}} \right)^2}{4}}{3}} \cdot \left(\left(l_{\text{Large Rectangle}} \cdot w_{\text{Large Rectangle}} \right) + \sqrt{l_{\text{Large Rectangle}} \cdot w_{\text{Large Rectangle}} \cdot l_{\text{Small Rectangle}} \cdot w_{\text{Small Rectangle}}} + \left(l_{\text{Small Rectangle}} \cdot w_{\text{Small Rectangle}} \right) \right)$$

Example with Units

$$25736.6349 \text{ m}^3 = \sqrt{\frac{43 \text{ m}^2 - \frac{\left(50 \text{ m} - 20 \text{ m} \right)^2}{4} - \frac{\left(25 \text{ m} - 10 \text{ m} \right)^2}{4}}{3}} \cdot \left(\left(50 \text{ m} \cdot 25 \text{ m} \right) + \sqrt{50 \text{ m} \cdot 25 \text{ m} \cdot 20 \text{ m} \cdot 10 \text{ m}} + \left(20 \text{ m} \cdot 10 \text{ m} \right) \right)$$

7.3) Volume of Ingot given Slant Height at Rectangular Lengths Formula

[Evaluate Formula !\[\]\(aff7c69c44a5e015f18c35867ef3f5c3_img.jpg\)](#)

Formula

$$V = \sqrt{\frac{h_{\text{Slant(Length)}}^2 - \frac{\left(l_{\text{Large Rectangle}} - l_{\text{Small Rectangle}} \right)^2}{4}}{3}} \cdot \left(\left(l_{\text{Large Rectangle}} \cdot w_{\text{Large Rectangle}} \right) + \sqrt{l_{\text{Large Rectangle}} \cdot w_{\text{Large Rectangle}} \cdot l_{\text{Small Rectangle}} \cdot w_{\text{Small Rectangle}}} + \left(l_{\text{Small Rectangle}} \cdot w_{\text{Small Rectangle}} \right) \right)$$

Example with Units

$$26200.322 \text{ m}^3 = \sqrt{\frac{41 \text{ m}^2 - \frac{\left(25 \text{ m} - 10 \text{ m} \right)^2}{4}}{3}} \cdot \left(\left(50 \text{ m} \cdot 25 \text{ m} \right) + \sqrt{50 \text{ m} \cdot 25 \text{ m} \cdot 20 \text{ m} \cdot 10 \text{ m}} + \left(20 \text{ m} \cdot 10 \text{ m} \right) \right)$$

7.4) Volume of Ingot given Slant Height at Rectangular Widths Formula

[Evaluate Formula !\[\]\(2885535958616e9ec6b97903614c334b_img.jpg\)](#)

Formula

$$V = \sqrt{\frac{h_{\text{Slant(Width)}}^2 - \frac{\left(l_{\text{Large Rectangle}} - l_{\text{Small Rectangle}} \right)^2}{4}}{3}} \cdot \left(\left(l_{\text{Large Rectangle}} \cdot w_{\text{Large Rectangle}} \right) + \sqrt{l_{\text{Large Rectangle}} \cdot w_{\text{Large Rectangle}} \cdot l_{\text{Small Rectangle}} \cdot w_{\text{Small Rectangle}}} + \left(l_{\text{Small Rectangle}} \cdot w_{\text{Small Rectangle}} \right) \right)$$

Example with Units

$$25499.5588 \text{ m}^3 = \sqrt{\frac{42 \text{ m}^2 - \frac{\left(50 \text{ m} - 20 \text{ m} \right)^2}{4}}{3}} \cdot \left(\left(50 \text{ m} \cdot 25 \text{ m} \right) + \sqrt{50 \text{ m} \cdot 25 \text{ m} \cdot 20 \text{ m} \cdot 10 \text{ m}} + \left(20 \text{ m} \cdot 10 \text{ m} \right) \right)$$



7.5) Volume of Ingot given Space Diagonal Formula ↻

Evaluate Formula ↻

Formula

$$V = \sqrt{\frac{d_{\text{Space}}^2 - \frac{(l_{\text{Large Rectangle}} + l_{\text{Small Rectangle}})^2}{4} - \frac{(w_{\text{Large Rectangle}} + w_{\text{Small Rectangle}})^2}{4}}{3}} \cdot \left((l_{\text{Large Rectangle}} \cdot w_{\text{Large Rectangle}}) + \sqrt{l_{\text{Large Rectangle}} \cdot w_{\text{Large Rectangle}} \cdot l_{\text{Small Rectangle}} \cdot w_{\text{Small Rectangle}}} \right)$$

Example with Units

$$26038.5651 \text{ m}^3 = \sqrt{\frac{56 \text{ m}^2 - \frac{(50 \text{ m} + 20 \text{ m})^2}{4} - \frac{(25 \text{ m} + 10 \text{ m})^2}{4}}{3}} \cdot \left((50 \text{ m} \cdot 25 \text{ m}) + \sqrt{50 \text{ m} \cdot 25 \text{ m} \cdot 20 \text{ m} \cdot 10 \text{ m}} + (20 \text{ m} \cdot 10 \text{ m}) \right)$$

8) Width of Ingot Formulas ↻

8.1) Larger Rectangular Width of Ingot given Length to Width Ratio of Rectangles Formula ↻

Evaluate Formula ↻

Formula

$$w_{\text{Large Rectangle}} = \frac{l_{\text{Large Rectangle}}}{R_{l/w}}$$

Example with Units

$$25 \text{ m} = \frac{50 \text{ m}}{2}$$

8.2) Smaller Rectangular Width of Ingot given Length to Width Ratio of Rectangles Formula ↻

Evaluate Formula ↻

Formula

$$w_{\text{Small Rectangle}} = \frac{l_{\text{Small Rectangle}}}{R_{l/w}}$$

Example with Units

$$10 \text{ m} = \frac{20 \text{ m}}{2}$$



Variables used in list of Ingot Formulas above

- **d_{Space}** Space Diagonal of Ingot (Meter)
- **h** Height of Ingot (Meter)
- **h_{Slant(Length)}** Slant Height at Rectangular Lengths of Ingot (Meter)
- **h_{Slant(Width)}** Slant Height at Rectangular Widths of Ingot (Meter)
- **l_{e(Skewed)}** Skewed Edge Length of Ingot (Meter)
- **l_{Large Rectangle}** Larger Rectangular Length of Ingot (Meter)
- **l_{Small Rectangle}** Smaller Rectangular Length of Ingot (Meter)
- **R_{A/V}** Surface to Volume Ratio of Ingot (1 per Meter)
- **R_{l/w}** Length to Width Ratio of Rectangles of Ingot
- **TSA** Total Surface Area of Ingot (Square Meter)
- **V** Volume of Ingot (Cubic Meter)
- **w_{Large Rectangle}** Larger Rectangular Width of Ingot (Meter)
- **w_{Small Rectangle}** Smaller Rectangular Width of Ingot (Meter)

Constants, Functions, Measurements used in list of Ingot Formulas 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 
- **Measurement:** **Reciprocal Length** in 1 per Meter (m⁻¹)
Reciprocal Length Unit Conversion 



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