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List of 21 Ingot Formulas

Ingot Height of Ingot 1) Height of Ingot given Skewed Edge Length 

fx

Open Calculator 

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

ex

$$39.59482\text{m} = \sqrt{(43\text{m})^2 - \frac{(50\text{m} - 20\text{m})^2}{4} - \frac{(25\text{m} - 10\text{m})^2}{4}}$$

2) Height of Ingot given Slant Height at Rectangular Lengths 

fx

Open Calculator 

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

ex

$$40.30819\text{m} = \sqrt{(41\text{m})^2 - \frac{(25\text{m} - 10\text{m})^2}{4}}$$

3) Height of Ingot given Slant Height at Rectangular Widths 

fx

Open Calculator 

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

ex

$$39.23009\text{m} = \sqrt{(42\text{m})^2 - \frac{(50\text{m} - 20\text{m})^2}{4}}$$

4) Height of Ingot given Space Diagonal 

fx

Open Calculator 

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

ex

$$40.05933\text{m} = \sqrt{(56\text{m})^2 - \frac{(50\text{m} + 20\text{m})^2}{4} - \frac{(25\text{m} + 10\text{m})^2}{4}}$$



Length of Ingot

5) Larger Rectangular Length of Ingot given Length to Width Ratio of Rectangles

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

[Open Calculator !\[\]\(a03a7eb2f4046e1d3c76772003e549ea_img.jpg\)](#)

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

6) Skewed Edge Length of Ingot

fx
[Open Calculator !\[\]\(5361750c22c4e047a52f4eac1ec2d4cc_img.jpg\)](#)

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

$$\text{ex } 43.37338\text{m} = \sqrt{(40\text{m})^2 + \frac{(50\text{m} - 20\text{m})^2}{4} + \frac{(25\text{m} - 10\text{m})^2}{4}}$$

7) Smaller Rectangular Length of Ingot given Length to Width Ratio of Rectangles

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

[Open Calculator !\[\]\(7d1d6890825e83a6a4a51febe2dcc7f3_img.jpg\)](#)

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

Slant Height of Ingot

8) Slant Height at Rectangular Lengths of Ingot

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

[Open Calculator !\[\]\(5d954b3e270654ad8ab0d5913161c03c_img.jpg\)](#)

$$\text{ex } 40.69705\text{m} = \sqrt{(40\text{m})^2 + \frac{(25\text{m} - 10\text{m})^2}{4}}$$



9) Slant Height at Rectangular Widths of Ingot

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

[Open Calculator !\[\]\(4c9516d2c24d0d513bc9f84c2e013d65_img.jpg\)](#)

$$\text{ex } 42.72002\text{m} = \sqrt{(40\text{m})^2 + \frac{(50\text{m} - 20\text{m})^2}{4}}$$



Space Diagonal of Ingot 10) Space Diagonal of Ingot 

fx

Open Calculator 

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

$$\text{ex } 55.95757\text{m} = \sqrt{(40\text{m})^2 + \frac{(50\text{m} + 20\text{m})^2}{4} + \frac{(25\text{m} + 10\text{m})^2}{4}}$$

Surface Area of Ingot Total Surface Area of Ingot 11) Total Surface Area of Ingot 

fx

Open Calculator 

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

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

12) Total Surface Area of Ingot given Height 

fx

Open Calculator 

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

$$\text{ex } 5793.994\text{m}^2 = (50\text{m} \cdot 25\text{m}) + (20\text{m} \cdot 10\text{m}) + \left(\sqrt{(40\text{m})^2 + \frac{(25\text{m} - 10\text{m})^2}{4}} \cdot (50\text{m} + 20\text{m}) \right) + \left(\sqrt{(40\text{m})^2 + \frac{(25\text{m} + 10\text{m})^2}{4}} \cdot (50\text{m} + 20\text{m}) \right)$$

Surface to Volume Ratio and Length to Width Ratio of Rectangles 13) Length to Width Ratio of Ingot 

fx

Open Calculator 

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

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



14) Surface to Volume Ratio of Ingot

fx

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

$$R_{A/V} = \frac{(l_{\text{Large Rectangle}} \cdot w_{\text{Large Rectangle}}) + (l_{\text{Small Rectangle}} \cdot w_{\text{Small Rectangle}})}{(l_{\text{Small Rectangle}} \cdot w_{\text{Small Rectangle}} \cdot h) + (l_{\text{Small Rectangle}} \cdot (w_{\text{Large Rectangle}} - w_{\text{Small Rectangle}}))}$$

ex

$$0.222692\text{m}^{-1} = \frac{(50\text{m} \cdot 25\text{m}) + (20\text{m} \cdot 10\text{m}) + (41\text{m} \cdot (50\text{m} + 20\text{m})) + (42\text{m} \cdot (25\text{m} + 10\text{m}))}{(20\text{m} \cdot 10\text{m} \cdot 40\text{m}) + (20\text{m} \cdot (25\text{m} - 10\text{m}) \cdot \frac{40\text{m}}{2}) + (10\text{m} \cdot (50\text{m} - 20\text{m}) \cdot \frac{40\text{m}}{2}) + ((50\text{m} - 20\text{m}) \cdot 10\text{m} \cdot \frac{40\text{m}}{2})}$$

Volume of Ingot

15) Volume of Ingot

fx

[Open Calculator !\[\]\(47734e4656765d20df4fdbd5b7aff048_img.jpg\)](#)

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

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

16) Volume of Ingot given Skewed Edge Length

fx

[Open Calculator !\[\]\(7bc43b319a082987e20f7bf78f4bab80_img.jpg\)](#)

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

ex

$$25736.63\text{m}^3 = \frac{\sqrt{(43\text{m})^2 - \frac{(50\text{m} - 20\text{m})^2}{4}} - \frac{(25\text{m} - 10\text{m})^2}{4}}{3} \cdot \left((50\text{m} \cdot 25\text{m}) + \sqrt{50\text{m} \cdot 25\text{m} \cdot 20\text{m} \cdot 10\text{m}} + (20\text{m} \cdot 10\text{m}) \right)$$

17) Volume of Ingot given Slant Height at Rectangular Lengths

fx

[Open Calculator !\[\]\(2088942ccfedc84a0a076c3fee3541aa_img.jpg\)](#)

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

ex $26200.32\text{m}^3 = \frac{\sqrt{(41\text{m})^2 - \frac{(25\text{m} - 10\text{m})^2}{4}}}{3} \cdot \left((50\text{m} \cdot 25\text{m}) + \sqrt{50\text{m} \cdot 25\text{m} \cdot 20\text{m} \cdot 10\text{m}} + (20\text{m} \cdot 10\text{m}) \right)$



18) Volume of Ingot given Slant Height at Rectangular Widths 

fx

Open Calculator 

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

ex $25499.56\text{m}^3 = \frac{\sqrt{(42\text{m})^2 - \frac{(50\text{m} - 20\text{m})^2}{4}}}{3} \cdot \left((50\text{m} \cdot 25\text{m}) + \sqrt{50\text{m} \cdot 25\text{m} \cdot 20\text{m} \cdot 10\text{m}} + (20\text{m} \cdot 10\text{m}) \right)$

19) Volume of Ingot given Space Diagonal 

fx

Open Calculator 

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

ex $26038.57\text{m}^3 = \frac{\sqrt{(56\text{m})^2 - \frac{(50\text{m} + 20\text{m})^2}{4} - \frac{(25\text{m} + 10\text{m})^2}{4}}}{3} \cdot \left((50\text{m} \cdot 25\text{m}) + \sqrt{50\text{m} \cdot 25\text{m} \cdot 20\text{m} \cdot 10\text{m}} + (20\text{m} \cdot 10\text{m}) \right)$

Width of Ingot 

20) Larger Rectangular Width of Ingot given Length to Width Ratio of Rectangles 

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

Open Calculator 

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

21) Smaller Rectangular Width of Ingot given Length to Width Ratio of Rectangles 

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

Open Calculator 

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







Variables Used

- **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

- **Function:** **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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