Important Formulas of Parallelepiped PDF

Formulas
Examples
with Units

List of 16
Important Formulas of Parallelepiped

1) Angle of Parallelepiped Formulas

1.1) Angle Alpha of Parallelepiped Formula

Evaluate Formula

Formula

$$\angle\alpha = asin\left(\frac{TSA - \left(2 \cdot S_a \cdot S_b \cdot \sin\left(\angle\gamma\right)\right) - \left(2 \cdot S_a \cdot S_c \cdot \sin\left(\angle\beta\right)\right)}{2 \cdot S_c \cdot S_b}\right)$$

Example with Units

$$44.6831° = asin\left(\frac{1960\,m^2 - \left(2 \cdot 30\,m \cdot 20\,m \cdot \sin\left(75°\right)\right) - \left(2 \cdot 30\,m \cdot 10\,m \cdot \sin\left(60°\right)\right)}{2 \cdot 10\,m \cdot 20\,m}\right)$$

1.2) Angle Beta of Parallelepiped Formula

Evaluate Formula

Formula

$$\angle\beta = asin\left(\frac{TSA - \left(2 \cdot S_a \cdot S_b \cdot \sin\left(\angle\gamma\right)\right) - \left(2 \cdot S_b \cdot S_c \cdot \sin\left(\angle\alpha\right)\right)}{2 \cdot S_a \cdot S_c}\right)$$

Example with Units

$$59.7017° = asin\left(\frac{1960\,m^2 - \left(2 \cdot 30\,m \cdot 20\,m \cdot \sin\left(75°\right)\right) - \left(2 \cdot 20\,m \cdot 10\,m \cdot \sin\left(45°\right)\right)}{2 \cdot 30\,m \cdot 10\,m}\right)$$

1.3) Angle Gamma of Parallelepiped Formula

Evaluate Formula

Formula

$$\angle\gamma = asin\left(\frac{TSA - \left(2 \cdot S_b \cdot S_c \cdot \sin\left(\angle\alpha\right)\right) - \left(2 \cdot S_a \cdot S_c \cdot \sin\left(\angle\beta\right)\right)}{2 \cdot S_b \cdot S_a}\right)$$

Example with Units

$$74.7132° = asin\left(\frac{1960\,m^2 - \left(2 \cdot 20\,m \cdot 10\,m \cdot \sin\left(45°\right)\right) - \left(2 \cdot 30\,m \cdot 10\,m \cdot \sin\left(60°\right)\right)}{2 \cdot 20\,m \cdot 30\,m}\right)$$

2) Perimeter of Parallelepiped Formulas

2.1) Perimeter of Parallelepiped Formula

Evaluate Formula

Formula

$$P = 4 \cdot \left(S_a + S_b + S_c\right)$$

Example with Units

$$240\,m = 4 \cdot \left(30\,m + 20\,m + 10\,m\right)$$

3) Side of Parallelepiped Formulas

3.1) Side A of Parallelepiped Formula

Evaluate Formula

Formula

$$S_a = \frac{V}{S_b \cdot S_c \cdot \sqrt{1 + \left(2 \cdot \cos\left(\angle\alpha\right) \cdot \cos\left(\angle\beta\right) \cdot \cos\left(\angle\gamma\right)\right) - \left(\cos\left(\angle\alpha\right)^2 + \cos\left(\angle\beta\right)^2 + \cos\left(\angle\gamma\right)^2\right)}}$$

Example with Units

$$30\,\text{m} = \frac{3630\,\text{m}^3}{20\,\text{m} \cdot 10\,\text{m} \cdot \sqrt{1 + \left(2 \cdot \cos\left(45°\right) \cdot \cos\left(60°\right) \cdot \cos\left(75°\right)\right) - \left(\cos\left(45°\right)^2 + \cos\left(60°\right)^2 + \cos\left(75°\right)^2\right)}}$$

3.2) Side A of Parallelepiped given Total Surface Area and Lateral Surface Area Formula

Evaluate Formula

Formula

$$S_a = \frac{\text{TSA} - \text{LSA}}{2 \cdot S_c \cdot \sin\left(\angle\beta\right)}$$

Example with Units

$$30.0222\,\text{m} = \frac{1960\,\text{m}^2 - 1440\,\text{m}^2}{2 \cdot 10\,\text{m} \cdot \sin\left(60°\right)}$$

3.3) Side B of Parallelepiped Formula

Evaluate Formula

Formula

$$S_b = \frac{V}{S_a \cdot S_c \cdot \sqrt{1 + \left(2 \cdot \cos\left(\angle\alpha\right) \cdot \cos\left(\angle\beta\right) \cdot \cos\left(\angle\gamma\right)\right) - \left(\cos\left(\angle\alpha\right)^2 + \cos\left(\angle\beta\right)^2 + \cos\left(\angle\gamma\right)^2\right)}}$$

Example with Units

$$20\,\text{m} = \frac{3630\,\text{m}^3}{30\,\text{m} \cdot 10\,\text{m} \cdot \sqrt{1 + \left(2 \cdot \cos\left(45°\right) \cdot \cos\left(60°\right) \cdot \cos\left(75°\right)\right) - \left(\cos\left(45°\right)^2 + \cos\left(60°\right)^2 + \cos\left(75°\right)^2\right)}}$$

3.4) Side B of Parallelepiped given Lateral Surface Area Formula

Evaluate Formula

Formula

$$S_b = \frac{\text{LSA}}{2 \cdot \left(S_a \cdot \sin\left(\angle\gamma\right) + S_c \cdot \sin\left(\angle\alpha\right)\right)}$$

Example with Units

$$19.9729\,\text{m} = \frac{1440\,\text{m}^2}{2 \cdot \left(30\,\text{m} \cdot \sin\left(75°\right) + 10\,\text{m} \cdot \sin\left(45°\right)\right)}$$

3.5) Side C of Parallelepiped Formula

Evaluate Formula

Formula

$$S_c = \frac{V}{S_b \cdot S_a \cdot \sqrt{1 + \left(2 \cdot \cos\left(\angle\alpha\right) \cdot \cos\left(\angle\beta\right) \cdot \cos\left(\angle\gamma\right)\right) - \left(\cos\left(\angle\alpha\right)^2 + \cos\left(\angle\beta\right)^2 + \cos\left(\angle\gamma\right)^2\right)}}$$

Example with Units

$$10\,\text{m} = \frac{3630\,\text{m}^3}{20\,\text{m} \cdot 30\,\text{m} \cdot \sqrt{1 + \left(2 \cdot \cos\left(45°\right) \cdot \cos\left(60°\right) \cdot \cos\left(75°\right)\right) - \left(\cos\left(45°\right)^2 + \cos\left(60°\right)^2 + \cos\left(75°\right)^2\right)}}$$

3.6) Side C of Parallelepiped given Total Surface Area and Lateral Surface Area Formula

Evaluate Formula

Formula

$$S_c = \frac{\text{TSA} - \text{LSA}}{2 \cdot S_a \cdot \sin\left(\angle\beta\right)}$$

Example with Units

$$10.0074\,\text{m} = \frac{1960\,\text{m}^2 - 1440\,\text{m}^2}{2 \cdot 30\,\text{m} \cdot \sin\left(60°\right)}$$

4) Surface Area of Parallelepiped Formulas

4.1) Lateral Surface Area of Parallelepiped Formula

Evaluate Formula

Formula

$$LSA = 2 \cdot \left(\left(S_a \cdot S_b \cdot \sin\left(\angle\gamma \right) \right) + \left(S_b \cdot S_c \cdot \sin\left(\angle\alpha \right) \right) \right)$$

Example with Units

$$1441.9537\,\text{m}^2 = 2 \cdot \left(\left(30\,\text{m} \cdot 20\,\text{m} \cdot \sin\left(75° \right) \right) + \left(20\,\text{m} \cdot 10\,\text{m} \cdot \sin\left(45° \right) \right) \right)$$

4.2) Lateral Surface Area of Parallelepiped given Total Surface Area Formula

Evaluate Formula

Formula

$$LSA = TSA - 2 \cdot S_a \cdot S_c \cdot \sin\left(\angle\beta \right)$$

Example with Units

$$1440.3848\,\text{m}^2 = 1960\,\text{m}^2 - 2 \cdot 30\,\text{m} \cdot 10\,\text{m} \cdot \sin\left(60° \right)$$

4.3) Total Surface Area of Parallelepiped Formula

Evaluate Formula

Formula

$$TSA = 2 \cdot \left(\left(S_a \cdot S_b \cdot \sin\left(\angle\gamma \right) \right) + \left(S_a \cdot S_c \cdot \sin\left(\angle\beta \right) \right) + \left(S_b \cdot S_c \cdot \sin\left(\angle\alpha \right) \right) \right)$$

Example with Units

$$1961.5689\,\text{m}^2 = 2 \cdot \left(\left(30\,\text{m} \cdot 20\,\text{m} \cdot \sin\left(75° \right) \right) + \left(30\,\text{m} \cdot 10\,\text{m} \cdot \sin\left(60° \right) \right) + \left(20\,\text{m} \cdot 10\,\text{m} \cdot \sin\left(45° \right) \right) \right)$$

4.4) Total Surface Area of Parallelepiped given Lateral Surface Area Formula

Evaluate Formula

Formula

$$TSA = LSA + 2 \cdot S_a \cdot S_c \cdot \sin\left(\angle\beta \right)$$

Example with Units

$$1959.6152\,\text{m}^2 = 1440\,\text{m}^2 + 2 \cdot 30\,\text{m} \cdot 10\,\text{m} \cdot \sin\left(60° \right)$$

5) Volume of Parallelepiped Formulas

5.1) Volume of Parallelepiped Formula

Evaluate Formula

Formula

$$V = S_a \cdot S_b \cdot S_c \cdot \sqrt{1 + \left(2 \cdot \cos\left(\angle\alpha \right) \cdot \cos\left(\angle\beta \right) \cdot \cos\left(\angle\gamma \right) \right) - \left(\cos\left(\angle\alpha \right)^2 + \cos\left(\angle\beta \right)^2 + \cos\left(\angle\gamma \right)^2 \right)}$$

Example with Units

$$3630.002\,\text{m}^3 = 30\,\text{m} \cdot 20\,\text{m} \cdot 10\,\text{m} \cdot \sqrt{1 + \left(2 \cdot \cos\left(45° \right) \cdot \cos\left(60° \right) \cdot \cos\left(75° \right) \right) - \left(\cos\left(45° \right)^2 + \cos\left(60° \right)^2 + \cos\left(75° \right)^2 \right)}$$

5.2) Volume of Parallelepiped given Total Surface Area and Lateral Surface Area Formula

Evaluate Formula

Formula

$$V = \frac{1}{2} \cdot \frac{TSA - LSA}{\sin\left(\angle\beta \right)} \cdot S_b \cdot \sqrt{1 + \left(2 \cdot \cos\left(\angle\alpha \right) \cdot \cos\left(\angle\beta \right) \cdot \cos\left(\angle\gamma \right) \right) - \left(\cos\left(\angle\alpha \right)^2 + \cos\left(\angle\beta \right)^2 + \cos\left(\angle\gamma \right)^2 \right)}$$

Example with Units

$$3632.6899\,\text{m}^3 = \frac{1}{2} \cdot \frac{1960\,\text{m}^2 - 1440\,\text{m}^2}{\sin\left(60° \right)} \cdot 20\,\text{m} \cdot \sqrt{1 + \left(2 \cdot \cos\left(45° \right) \cdot \cos\left(60° \right) \cdot \cos\left(75° \right) \right) - \left(\cos\left(45° \right)^2 + \cos\left(60° \right)^2 + \cos\left(75° \right)^2 \right)}$$

Variables used in list of Important Formulas of Parallelepiped above

- ∠**α** Angle Alpha of Parallelepiped *(Degree)*
- ∠**β** Angle Beta of Parallelepiped *(Degree)*
- ∠**γ** Angle Gamma of Parallelepiped *(Degree)*
- **LSA** Lateral Surface Area of Parallelepiped *(Square Meter)*
- **P** Perimeter of Parallelepiped *(Meter)*
- S_a Side A of Parallelepiped *(Meter)*
- S_b Side B of Parallelepiped *(Meter)*
- S_c Side C of Parallelepiped *(Meter)*
- **TSA** Total Surface Area of Parallelepiped *(Square Meter)*
- **V** Volume of Parallelepiped *(Cubic Meter)*

Constants, Functions, Measurements used in list of Important Formulas of Parallelepiped above

- Functions: **asin**, asin(Number)
  The inverse sine function, is a trigonometric function that takes a ratio of two sides of a right triangle and outputs the angle opposite the side with the given 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: **sin**, sin(Angle)
  Sine is a trigonometric function that describes the ratio of the length of the opposite side of a right triangle to the length of the hypotenuse.
- 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: **Angle** in Degree (°)
  Angle Unit Conversion

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- Important Hollow Cuboid Formulas
- Important Hollow Cylinder Formulas
- Important Hollow Frustum Formulas
- Important Hollow Hemisphere Formulas
- Important Hollow Pyramid Formulas
- Important Hollow Sphere Formulas
- Important Ingot Formulas
- Important Obelisk Formulas
- Important Oblique Cylinder Formulas
- Important Oblique Prism Formulas
- Important Obtuse Edged Cuboid Formulas
- Important Oloid Formulas
- Important Paraboloid Formulas
- Important Parallelepiped Formulas
- Important Ramp Formulas
- Important Regular Bipyramid Formulas
- Important Rhombohedron Formulas
- Important Right Wedge Formulas
- Important Semi Ellipsoid Formulas
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- Important Small Stellated Dodecahedron Formulas
- Important Solid of Revolution Formulas
- Important Sphere Formulas
- Important Spherical Cap Formulas
- Important Spherical Corner Formulas
- Important Spherical Ring Formulas
- Important Spherical Sector Formulas
- Important Spherical Segment Formulas
- Important Spherical Wedge Formulas
- Important Square Pillar Formulas
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