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Important Formulas of Trapezoid

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List of 30 Important Formulas of Trapezoid

Important Formulas of Trapezoid ⌤

1) Area of Trapezoid ⌤

Open Calculator ⌤

fx $A = \left(\dfrac{B_{Short} + B_{Long}}{2} \right) \cdot h$

ex $80m^2 = \left(\dfrac{5m + 15m}{2} \right) \cdot 8m$

2) Inradius of Trapezoid ⌤

Open Calculator ⌤

fx $r_i = \dfrac{h}{2}$

ex $4m = \dfrac{8m}{2}$

3) Perimeter of Trapezoid ⌤

fx $P = B_{Short} + B_{Long} + L_{Short} + L_{Long}$

Open Calculator ⌤

ex $40m = 5m + 15m + 9m + 11m$

4) X Coordinate of Centroid of Trapezoid ☒

fx $$G_x = \left(\frac{B_{Long} + 2 \cdot B_{Short}}{3 \cdot (B_{Short} + B_{Long})} \right) \cdot h$$

ex $$3.333333m = \left(\frac{15m + 2 \cdot 5m}{3 \cdot (5m + 15m)} \right) \cdot 8m$$

Central Median of Trapezoid ☒

5) Central Median of Trapezoid ☒

fx $$M = \frac{B_{Long} + B_{Short}}{2}$$

ex $$10m = \frac{15m + 5m}{2}$$

6) Central Median of Trapezoid given Height, and Long Base ☒

fx

$$M = B_{Long} - \left(h \cdot \frac{\cot(\angle_{Smaller\ Acute}) + \cot(\angle_{Larger\ Acute})}{2} \right)$$

ex $$10.18772m = 15m - \left(8m \cdot \frac{\cot(50°) + \cot(70°)}{2} \right)$$

7) Central Median of Trapezoid given Height, and Short Base 🔗

fx

$$M = B_{\text{Short}} + \left(h \cdot \frac{\cot(\angle_{\text{Smaller Acute}}) + \cot(\angle_{\text{Larger Acute}})}{2} \right)$$

ex $9.812279\text{m} = 5\text{m} + \left(8\text{m} \cdot \dfrac{\cot(50°) + \cot(70°)}{2} \right)$

Diagonal of Trapezoid 🔗

8) Long Diagonal of Trapezoid 🔗

fx

$$d_{\text{Long}} = \sqrt{B_{\text{Long}}^2 + L_{\text{Short}}^2 - (2 \cdot B_{\text{Long}} \cdot L_{\text{Short}} \cdot \cos(\angle_{\text{Larger Acute}}))}$$

ex $14.61693\text{m} = \sqrt{(15\text{m})^2 + (9\text{m})^2 - (2 \cdot (15\text{m}) \cdot (9\text{m}) \cdot \cos(70°))}$

9) Long Diagonal of Trapezoid given all Sides 🔗

fx

$$d_{\text{Long}} = \sqrt{L_{\text{Short}}^2 + (B_{\text{Short}} \cdot B_{\text{Long}}) - \left(B_{\text{Long}} \cdot \frac{L_{\text{Short}}^2 - L_{\text{Long}}^2}{B_{\text{Long}} - B_{\text{Short}}} \right)}$$

ex $14.69694\text{m} = \sqrt{(9\text{m})^2 + (5\text{m} \cdot 15\text{m}) - \left(15\text{m} \cdot \dfrac{(9\text{m})^2 - (11\text{m})^2}{15\text{m} - 5\text{m}} \right)}$

10) Long Diagonal of Trapezoid given Short Diagonal ↗

fx
$$d_{Long} = \frac{h \cdot (B_{Long} + B_{Short})}{d_{Short} \cdot \sin(\angle_{d(Leg)})}$$

Open Calculator ↗

ex
$$13.53902m = \frac{8m \cdot (15m + 5m)}{12m \cdot \sin(80°)}$$

11) Short Diagonal of Trapezoid ↗

fx

Open Calculator ↗

$$d_{Short} = \sqrt{B_{Long}^2 + L_{Long}^2 - (2 \cdot B_{Long} \cdot L_{Long} \cdot \cos(\angle_{Smaller\ Acute}))}$$

ex
$$11.57066m = \sqrt{(15m)^2 + (11m)^2 - (2 \cdot (15m) \cdot (11m) \cdot \cos(50°))}$$

12) Short Diagonal of Trapezoid given all Sides ↗

fx

Open Calculator ↗

$$d_{Short} = \sqrt{L_{Long}^2 + (B_{Short} \cdot B_{Long}) - \left(B_{Long} \cdot \frac{L_{Long}^2 - L_{Short}^2}{B_{Long} - B_{Short}}\right)}$$

ex
$$11.6619m = \sqrt{(11m)^2 + (5m \cdot 15m) - \left(15m \cdot \frac{(11m)^2 - (9m)^2}{15m - 5m}\right)}$$

13) Short Diagonal of Trapezoid given Long Diagonal ⌇

$$fx \quad d_{Short} = \frac{h \cdot (B_{Long} + B_{Short})}{d_{Long} \cdot \sin(\angle_{d(Leg)})}$$

Open Calculator ⌇

$$ex \quad 11.60488m = \frac{8m \cdot (15m + 5m)}{14m \cdot \sin(80°)}$$

Height of Trapezoid ⌇

14) Height of Trapezoid ⌇

fx   **Open Calculator** ⌇

$$h = \sqrt{L_{Long}^2 - \left(\frac{(B_{Long} - B_{Short})^2 + L_{Long}^2 - L_{Short}^2}{2 \cdot (B_{Long} - B_{Short})} \right)^2}$$

$$ex \quad 8.485281m = \sqrt{(11m)^2 - \left(\frac{(15m - 5m)^2 + (11m)^2 - (9m)^2}{2 \cdot (15m - 5m)} \right)^2}$$

15) Height of Trapezoid given Area ⌇

$$fx \quad h = \frac{2 \cdot A}{B_{Long} + B_{Short}}$$

Open Calculator ⌇

$$ex \quad 8.5m = \frac{2 \cdot 85m^2}{15m + 5m}$$

16) Height of Trapezoid given Both Diagonals and Leg Angle between Diagonals 🔗

fx
$$h = \frac{d_{Long} \cdot d_{Short}}{B_{Long} + B_{Short}} \cdot \sin\left(\angle_{d(Leg)}\right)$$

Open Calculator 🔗

ex
$$8.272385m = \frac{14m \cdot 12m}{15m + 5m} \cdot \sin(80°)$$

17) Height of Trapezoid given Long Leg 🔗

fx
$$h = L_{Long} \cdot \sin(\angle_{Smaller\ Acute})$$

Open Calculator 🔗

ex
$$8.426489m = 11m \cdot \sin(50°)$$

18) Height of Trapezoid given Short Leg 🔗

fx
$$h = L_{Short} \cdot \sin(\angle_{Larger\ Acute})$$

Open Calculator 🔗

ex
$$8.457234m = 9m \cdot \sin(70°)$$

Sides of Trapezoid 🔗

19) Long Base of Trapezoid 🔗

fx
$$B_{Long} = \frac{2 \cdot A}{h} - B_{Short}$$

Open Calculator 🔗

ex
$$16.25m = \frac{2 \cdot 85m^2}{8m} - 5m$$

20) Long Base of Trapezoid given Long Leg 🔗

fx

$$B_{Long} = B_{Short} + \left(L_{Long} \cdot \frac{\sin(\angle_{Smaller\ Acute} + \angle_{Larger\ Acute})}{\sin(\angle_{Larger\ Acute})} \right)$$

ex $15.13765m = 5m + \left(11m \cdot \dfrac{\sin(50° + 70°)}{\sin(70°)} \right)$

21) Long Base of Trapezoid given Short Leg 🔗

fx

$$B_{Long} = B_{Short} + \left(L_{Short} \cdot \frac{\sin(\angle_{Smaller\ Acute} + \angle_{Larger\ Acute})}{\sin(\angle_{Smaller\ Acute})} \right)$$

ex $15.17464m = 5m + \left(9m \cdot \dfrac{\sin(50° + 70°)}{\sin(50°)} \right)$

22) Long Leg of Trapezoid 🔗

fx $L_{Long} = P - (B_{Long} + B_{Short} + L_{Short})$

ex $11m = 40m - (15m + 5m + 9m)$

23) Long Leg of Trapezoid given Height 🔗

fx $L_{Long} = \dfrac{h}{\sin(\angle_{Smaller\ Acute})}$

ex $10.44326m = \dfrac{8m}{\sin(50°)}$

24) Long Leg of Trapezoid given Short Leg ⏏

fx
$$L_{Long} = L_{Short} \cdot \frac{\sin(\angle_{Larger\ Acute})}{\sin(\angle_{Smaller\ Acute})}$$

Open Calculator ⏏

ex
$$11.04013m = 9m \cdot \frac{\sin(70°)}{\sin(50°)}$$

25) Short Base of Trapezoid ⏏

fx
$$B_{Short} = \frac{2 \cdot A}{h} - B_{Long}$$

Open Calculator ⏏

ex
$$6.25m = \frac{2 \cdot 85m^2}{8m} - 15m$$

26) Short Base of Trapezoid given Long Leg ⏏

fx

Open Calculator ⏏

$$B_{Short} = B_{Long} - \left(L_{Long} \cdot \frac{\sin(\angle_{Smaller\ Acute} + \angle_{Larger\ Acute})}{\sin(\angle_{Larger\ Acute})} \right)$$

ex
$$4.862345m = 15m - \left(11m \cdot \frac{\sin(50° + 70°)}{\sin(70°)} \right)$$

27) Short Base of Trapezoid given Short Leg ⏏

fx

Open Calculator ⏏

$$B_{Short} = B_{Long} - \left(L_{Short} \cdot \frac{\sin(\angle_{Smaller\ Acute} + \angle_{Larger\ Acute})}{\sin(\angle_{Smaller\ Acute})} \right)$$

ex
$$4.825357m = 15m - \left(9m \cdot \frac{\sin(50° + 70°)}{\sin(50°)} \right)$$

28) Short Leg of Trapezoid ⏏

fx $L_{Short} = P - (B_{Long} + B_{Short} + L_{Long})$

Open Calculator ⏏

ex $9m = 40m - (15m + 5m + 11m)$

29) Short Leg of Trapezoid given Height ⏏

fx $L_{Short} = \dfrac{h}{\sin(\angle_{Larger\ Acute})}$

Open Calculator ⏏

ex $8.513422m = \dfrac{8m}{\sin(70°)}$

30) Short Leg of Trapezoid given Long Leg ⏏

fx $L_{Short} = L_{Long} \cdot \dfrac{\sin(\angle_{Smaller\ Acute})}{\sin(\angle_{Larger\ Acute})}$

Open Calculator ⏏

ex $8.967282m = 11m \cdot \dfrac{\sin(50°)}{\sin(70°)}$

Variables Used

- $\angle_{d(Leg)}$ Leg Angle between Diagonals of Trapezoid *(Degree)*
- $\angle_{Larger\ Acute}$ Larger Acute Angle of Trapezoid *(Degree)*
- $\angle_{Smaller\ Acute}$ Smaller Acute Angle of Trapezoid *(Degree)*
- A Area of Trapezoid *(Square Meter)*
- B_{Long} Long Base of Trapezoid *(Meter)*
- B_{Short} Short Base of Trapezoid *(Meter)*
- d_{Long} Long Diagonal of Trapezoid *(Meter)*
- d_{Short} Short Diagonal of Trapezoid *(Meter)*
- G_x X Coordinate of Centroid of Trapezoid *(Meter)*
- h Height of Trapezoid *(Meter)*
- L_{Long} Long Leg of Trapezoid *(Meter)*
- L_{Short} Short Leg of Trapezoid *(Meter)*
- M Central Median of Trapezoid *(Meter)*
- P Perimeter of Trapezoid *(Meter)*
- r_i Inradius of Trapezoid *(Meter)*

Constants, Functions, Measurements used

- Function: **cos**, cos(Angle)
  Trigonometric cosine function
- Function: **cot**, cot(Angle)
  Trigonometric cotangent function
- Function: **sin**, sin(Angle)
  Trigonometric sine function
- Function: **sqrt**, sqrt(Number)
  Square root function
- Measurement: **Length** in Meter (m)
  Length Unit Conversion 🗗
- Measurement: **Area** in Square Meter (m²)
  Area Unit Conversion 🗗
- Measurement: **Angle** in Degree (°)
  Angle Unit Conversion 🗗

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