

# Important X Shape Formulas PDF



**Formulas**  
**Examples**  
**with Units**

**List of 24**  
**Important X Shape Formulas**

## 1) Angles of X Shape Formulas

### 1.1) Bottom and Top Angle of X Shape Formulas

#### 1.1.1) Bottom and Top Angle of X Shape given Crossing Length Formula

Formula

Evaluate Formula

$$\angle_{\text{Bottom/Top}} = \pi - \left( 2 \cdot \arccos \left( \frac{t_{\text{Bar}}}{2 \cdot l_{\text{Crossing}}} \right) \right)$$

Example with Units

$$38.9424^\circ = 3.1416 - \left( 2 \cdot \arccos \left( \frac{2 \text{ m}}{2 \cdot 3 \text{ m}} \right) \right)$$

#### 1.1.2) Bottom and Top Angle of X Shape given Left or Right Angle Formula

Formula

Example with Units

Evaluate Formula

$$\angle_{\text{Bottom/Top}} = \pi - \angle_{\text{Left/Right}}$$

$$45^\circ = 3.1416 - 135^\circ$$

### 1.2) Left and Right Angle of X Shape Formulas

#### 1.2.1) Left and Right Angle of X Shape given Bottom or Top Angle Formula

Formula

Example with Units

Evaluate Formula

$$\angle_{\text{Left/Right}} = \pi - \angle_{\text{Bottom/Top}}$$

$$135^\circ = 3.1416 - 45^\circ$$



## 2) Area of X Shape Formulas ↻

### 2.1) Area of X Shape given Bottom or Top Angle Formula ↻

Formula

Evaluate Formula ↻

$$A = \left( 2 \cdot l_{\text{Bar}} \cdot t_{\text{Bar}} \cdot \sin \left( \angle_{\text{Bottom/Top}} \right) \right) - \left( \frac{t_{\text{Bar}}^2}{2} \cdot \cot \left( \frac{\angle_{\text{Bottom/Top}}}{2} \right) \right)$$

Example with Units

$$51.7401 \text{ m}^2 = \left( 2 \cdot 20 \text{ m} \cdot 2 \text{ m} \cdot \sin \left( 45^\circ \right) \right) - \left( \frac{2 \text{ m}^2}{2} \cdot \cot \left( \frac{45^\circ}{2} \right) \right)$$

### 2.2) Area of X Shape given Left or Right Angle Formula ↻

Formula

Evaluate Formula ↻

$$A = \left( 2 \cdot l_{\text{Bar}} \cdot t_{\text{Bar}} \cdot \sin \left( \angle_{\text{Left/Right}} \right) \right) - \frac{\left( t_{\text{Bar}} \cdot \sin \left( \frac{\angle_{\text{Left/Right}}}{2} \right) \right)^2}{\sin \left( \angle_{\text{Left/Right}} \right)}$$

Example with Units

$$51.7401 \text{ m}^2 = \left( 2 \cdot 20 \text{ m} \cdot 2 \text{ m} \cdot \sin \left( 135^\circ \right) \right) - \frac{\left( 2 \text{ m} \cdot \sin \left( \frac{135^\circ}{2} \right) \right)^2}{\sin \left( 135^\circ \right)}$$

## 3) Bar Thickness of X Shape Formulas ↻

### 3.1) Bar Thickness of X Shape given Crossing Length and Bottom or Top Angle Formula ↻

Formula

Example with Units

Evaluate Formula ↻

$$t_{\text{Bar}} = 2 \cdot l_{\text{Crossing}} \cdot \sin \left( \frac{\angle_{\text{Bottom/Top}}}{2} \right)$$

$$2.2961 \text{ m} = 2 \cdot 3 \text{ m} \cdot \sin \left( \frac{45^\circ}{2} \right)$$

### 3.2) Bar Thickness of X Shape given Perimeter and Arm Lengths Formula ↻

Formula

Example with Units

Evaluate Formula ↻

$$t_{\text{Bar}} = \frac{P}{4} - l_{\text{Inner Arm}} - l_{\text{Outer Arm}}$$

$$1.75 \text{ m} = \frac{75 \text{ m}}{4} - 7 \text{ m} - 10 \text{ m}$$

## 4) Height of X Shape Formulas ↻

### 4.1) Height of X Shape given Bottom or Top Angle Formula ↻

Formula

Example with Units

Evaluate Formula ↻

$$h = l_{\text{Bar}} \cdot \cos \left( \frac{\angle_{\text{Bottom/Top}}}{2} \right)$$

$$18.4776 \text{ m} = 20 \text{ m} \cdot \cos \left( \frac{45^\circ}{2} \right)$$



## 4.2) Height of X Shape given Outer Arm Length and Left or Right Angle Formula ↻

Formula

$$h = 2 \cdot l_{\text{Outer Arm}} \cdot \sin\left(\frac{\angle_{\text{Left/Right}}}{2}\right)$$

Example with Units

$$18.4776 \text{ m} = 2 \cdot 10 \text{ m} \cdot \sin\left(\frac{135^\circ}{2}\right)$$

Evaluate Formula ↻

## 5) Lengths of X Shape Formulas ↻

### 5.1) Bar Length of X Shape Formulas ↻

#### 5.1.1) Bar Length of X Shape given Outer Arm Length Formula ↻

Formula

$$l_{\text{Bar}} = 2 \cdot l_{\text{Outer Arm}}$$

Example with Units

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

Evaluate Formula ↻

### 5.2) Crossing Length of X Shape Formulas ↻

#### 5.2.1) Crossing Length of X Shape given Bottom or Top Angle Formula ↻

Formula

$$l_{\text{Crossing}} = \frac{t_{\text{Bar}}}{2} \cdot \operatorname{cosec}\left(\frac{\angle_{\text{Bottom/Top}}}{2}\right)$$

Example with Units

$$2.6131 \text{ m} = \frac{2 \text{ m}}{2} \cdot \operatorname{cosec}\left(\frac{45^\circ}{2}\right)$$

Evaluate Formula ↻

#### 5.2.2) Crossing Length of X Shape given Inner and Outer Arm Lengths Formula ↻

Formula

$$l_{\text{Crossing}} = l_{\text{Outer Arm}} - l_{\text{Inner Arm}}$$

Example with Units

$$3 \text{ m} = 10 \text{ m} - 7 \text{ m}$$

Evaluate Formula ↻

#### 5.2.3) Crossing Length of X Shape given Left or Right Angle Formula ↻

Formula

$$l_{\text{Crossing}} = t_{\text{Bar}} \cdot \frac{\sin\left(\frac{\angle_{\text{Left/Right}}}{2}\right)}{\sin\left(\angle_{\text{Left/Right}}\right)}$$

Example with Units

$$2.6131 \text{ m} = 2 \text{ m} \cdot \frac{\sin\left(\frac{135^\circ}{2}\right)}{\sin\left(135^\circ\right)}$$

Evaluate Formula ↻

#### 5.2.4) Crossing Length of X Shape given Perimeter Formula ↻

Formula

$$l_{\text{Crossing}} = t_{\text{Bar}} + l_{\text{Bar}} - \frac{P}{4}$$

Example with Units

$$3.25 \text{ m} = 2 \text{ m} + 20 \text{ m} - \frac{75 \text{ m}}{4}$$

Evaluate Formula ↻



## 5.3) Inner Arm Length of X Shape Formulas

### 5.3.1) Inner Arm Length of X Shape given Bottom or Top Angle Formula

Formula

$$l_{\text{Inner Arm}} = \frac{l_{\text{Bar}}}{2} - \frac{t_{\text{Bar}}}{2 \cdot \cos\left(\frac{\pi}{2} - \frac{\angle_{\text{Bottom/Top}}}{2}\right)}$$

Example with Units

$$7.3869 \text{ m} = \frac{20 \text{ m}}{2} - \frac{2 \text{ m}}{2 \cdot \cos\left(\frac{3.1416}{2} - \frac{45^\circ}{2}\right)}$$

Evaluate Formula

### 5.3.2) Inner Arm Length of X Shape given Crossing Length Formula

Formula

$$l_{\text{Inner Arm}} = \frac{l_{\text{Bar}}}{2} - l_{\text{Crossing}}$$

Example with Units

$$7 \text{ m} = \frac{20 \text{ m}}{2} - 3 \text{ m}$$

Evaluate Formula

### 5.3.3) Inner Arm Length of X Shape given Outer Arm Length and Crossing Length Formula

Formula

$$l_{\text{Inner Arm}} = l_{\text{Outer Arm}} - l_{\text{Crossing}}$$

Example with Units

$$7 \text{ m} = 10 \text{ m} - 3 \text{ m}$$

Evaluate Formula

### 5.3.4) Inner Arm Length of X Shape given Perimeter Formula

Formula

$$l_{\text{Inner Arm}} = \frac{P}{4} - t_{\text{Bar}} - \frac{l_{\text{Bar}}}{2}$$

Example with Units

$$6.75 \text{ m} = \frac{75 \text{ m}}{4} - 2 \text{ m} - \frac{20 \text{ m}}{2}$$

Evaluate Formula

## 5.4) Outer Arm Length of X Shape Formulas

### 5.4.1) Outer Arm Length of X Shape Formula

Formula

$$l_{\text{Outer Arm}} = \frac{l_{\text{Bar}}}{2}$$

Example with Units

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

Evaluate Formula

### 5.4.2) Outer Arm Length of X Shape given Crossing and Inner Arm Length Formula

Formula

$$l_{\text{Outer Arm}} = l_{\text{Inner Arm}} + l_{\text{Crossing}}$$

Example with Units

$$10 \text{ m} = 7 \text{ m} + 3 \text{ m}$$

Evaluate Formula

### 5.4.3) Outer Arm Length of X Shape given Perimeter and Inner Arm Length Formula

Formula

$$l_{\text{Outer Arm}} = \frac{P}{4} - t_{\text{Bar}} - l_{\text{Inner Arm}}$$

Example with Units

$$9.75 \text{ m} = \frac{75 \text{ m}}{4} - 2 \text{ m} - 7 \text{ m}$$

Evaluate Formula



## 6) Perimeter of X Shape Formulas

### 6.1) Perimeter of X Shape given Arm Lengths Formula

Formula

$$P = 4 \cdot (t_{\text{Bar}} + l_{\text{Outer Arm}} + l_{\text{Inner Arm}})$$

Example with Units

$$76\text{ m} = 4 \cdot (2\text{ m} + 10\text{ m} + 7\text{ m})$$

Evaluate Formula 

### 6.2) Perimeter of X Shape given Crossing Length Formula

Formula

$$P = 4 \cdot (t_{\text{Bar}} + l_{\text{Bar}} - l_{\text{Crossing}})$$

Example with Units

$$76\text{ m} = 4 \cdot (2\text{ m} + 20\text{ m} - 3\text{ m})$$

Evaluate Formula 

## 7) Width of X Shape Formulas

### 7.1) Width of X Shape given Inner Arm Length and Bottom or Top Angle Formula

Formula

$$w = \left( 2 \cdot l_{\text{Inner Arm}} \cdot \sin\left(\frac{\angle_{\text{Bottom/Top}}}{2}\right) \right) + (2 \cdot t_{\text{Bar}})$$

Evaluate Formula 

Example with Units




$$9.3576\text{ m} = \left( 2 \cdot 7\text{ m} \cdot \sin\left(\frac{45^\circ}{2}\right) \right) + (2 \cdot 2\text{ m})$$



## Variables used in list of X Shape Formulas above

- $\angle$  **Bottom/Top** Bottom and Top Angle of X Shape (Degree)
- $\angle$  **Left/Right** Left and Right Angle of X Shape (Degree)
- **A** Area of X Shape (Square Meter)
- **h** Height of X shape (Meter)
- **l<sub>Bar</sub>** Bar Length of X Shape (Meter)
- **l<sub>Crossing</sub>** Crossing Length of X Shape (Meter)
- **l<sub>Inner Arm</sub>** Inner Arm Length of X Shape (Meter)
- **l<sub>Outer Arm</sub>** Outer Arm Length of X Shape (Meter)
- **P** Perimeter of X Shape (Meter)
- **t<sub>Bar</sub>** Bar Thickness of X Shape (Meter)
- **w** Width of X Shape (Meter)

## Constants, Functions, Measurements used in list of X Shape Formulas above

- **constant(s):**  $\pi$ , 3.14159265358979323846264338327950288  
*Archimedes' constant*
- **Functions: acos**,  $\text{acos}(\text{Number})$   
*The inverse cosine function, is the inverse function of the cosine function. It is the function that takes a ratio as an input and returns the angle whose cosine is equal to that ratio.*
- **Functions: cos**,  $\text{cos}(\text{Angle})$   
*Cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse of the triangle.*
- **Functions: cosec**,  $\text{cosec}(\text{Angle})$   
*The cosecant function is a trigonometric function that is the reciprocal of the sine function.*
- **Functions: cot**,  $\text{cot}(\text{Angle})$   
*Cotangent is a trigonometric function that is defined as the ratio of the adjacent side to the opposite side in a right triangle.*
- **Functions: sec**,  $\text{sec}(\text{Angle})$   
*Secant is a trigonometric function that is defined ratio of the hypotenuse to the shorter side adjacent to an acute angle (in a right-angled triangle); the reciprocal of a cosine.*
- **Functions: sin**,  $\text{sin}(\text{Angle})$   
*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.*
- **Measurement: Length** in Meter (m)  
*Length Unit Conversion* 
- **Measurement: Area** in Square Meter (m<sup>2</sup>)  
*Area Unit Conversion* 
- **Measurement: Angle** in Degree (°)  
*Angle Unit Conversion* 



- [Important Annulus Formulas](#) 
- [Important Antiparallelogram Formulas](#) 
- [Important Arrow Hexagon Formulas](#) 
- [Important Astroid Formulas](#) 
- [Important Bulge Formulas](#) 
- [Important Cardioid Formulas](#) 
- [Important Circular Arc Quadrangle Formulas](#) 
- [Important Concave Pentagon Formulas](#) 
- [Important Concave Regular Hexagon Formulas](#) 
- [Important Concave Regular Pentagon Formulas](#) 
- [Important Crossed Rectangle Formulas](#) 
- [Important Cut Rectangle Formulas](#) 
- [Important Cyclic Quadrilateral Formulas](#) 
- [Important Cycloid Formulas](#) 
- [Important Decagon Formulas](#) 
- [Important Dodecagon Formulas](#) 
- [Important Double Cycloid Formulas](#) 
- [Important Fourstar Formulas](#) 
- [Important Frame Formulas](#) 
- [Important Grid Formulas](#) 
- [Important H Shape Formulas](#) 
- [Important Half Yin-Yang Formulas](#) 
- [Important Heart Shape Formulas](#) 
- [Important Hendecagon Formulas](#) 
- [Important Heptagon Formulas](#) 
- [Important Hexadecagon Formulas](#) 
- [Important Hexagon Formulas](#) 
- [Important Hexagram Formulas](#) 
- [Important House Shape Formulas](#) 
- [Important Hyperbola Formulas](#) 
- [Important Hypocycloid Formulas](#) 
- [Important Isosceles Trapezoid Formulas](#) 
- [Important L Shape Formulas](#) 
- [Important Line Formulas](#) 
- [Important N-gon Formulas](#) 
- [Important Nonagon Formulas](#) 
- [Important Octagon Formulas](#) 
- [Important Octagram Formulas](#) 
- [Important Open Frame Formulas](#) 
- [Important Parallelogram Formulas](#) 
- [Important Pentagon Formulas](#) 
- [Important Pentagram Formulas](#) 
- [Important Polygram Formulas](#) 
- [Important Quadrilateral Formulas](#) 
- [Important Quarter Circle Formulas](#) 
- [Important Rectangle Formulas](#) 
- [Important Rectangular Hexagon Formulas](#) 
- [Important Regular Polygon Formulas](#) 
- [Important Reuleaux Triangle Formulas](#) 
- [Important Rhombus Formulas](#) 
- [Important Right Trapezoid Formulas](#) 
- [Important Round Corner Formulas](#) 
- [Important Salinon Formulas](#) 
- [Important Semicircle Formulas](#) 
- [Important Sharp Kink Formulas](#) 



- [Important Square Formulas](#) 
- [Important Star of Lakshmi Formulas](#) 
- [Important T Shape Formulas](#) 
- [Important Tangential Quadrilateral Formulas](#) 
- [Important Trapezoid Formulas](#) 
- [Important Tri-equilateral Trapezoid Formulas](#) 
- [Important Truncated Square Formulas](#) 
- [Important Unicursal Hexagram Formulas](#) 
- [Important X Shape Formulas](#) 

### Try our Unique Visual Calculators

-  [Percentage growth](#) 
-  [LCM calculator](#) 
-  [Divide fraction](#) 

Please SHARE this PDF with someone who needs it!

This PDF can be downloaded in these languages

[English](#) [Spanish](#) [French](#) [German](#) [Russian](#) [Italian](#) [Portuguese](#) [Polish](#) [Dutch](#)

7/8/2024 | 11:54:24 AM UTC

