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# Pivot Centre, Wheel Base and Track Formulas

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# List of 12 Pivot Centre, Wheel Base and Track Formulas

## Pivot Centre, Wheel Base and Track

### 1) Pivot Centre given Turning Radius of Inner Front Wheel

$$\text{fx } c = a_{tw} - 2 \cdot \left( \frac{b}{\sin(\theta)} - R_{IF} \right)$$

[Open Calculator !\[\]\(a870788d6ed9b8fd294b7654a8c8526b\_img.jpg\)](#)

$$\text{ex } 3198.091\text{mm} = 1999\text{mm} - 2 \cdot \left( \frac{2700\text{mm}}{\sin(40^\circ)} - 4800\text{mm} \right)$$

### 2) Pivot Centre given Turning Radius of Inner Rear Wheel

$$\text{fx } c = a_{tw} - 2 \cdot \left( \frac{b}{\tan(\theta)} - R_{IR} \right)$$

[Open Calculator !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d\_img.jpg\)](#)

$$\text{ex } 1363.531\text{mm} = 1999\text{mm} - 2 \cdot \left( \frac{2700\text{mm}}{\tan(40^\circ)} - 2900\text{mm} \right)$$

### 3) Pivot Centre given Turning Radius of Outer Front Wheel

$$\text{fx } c = a_{tw} - 2 \cdot \left( -\frac{b}{\sin(\phi)} + R_{OF} \right)$$

[Open Calculator !\[\]\(f60b7a900783ac3fd531bfd9c111be6d\_img.jpg\)](#)

$$\text{ex } 2579\text{mm} = 1999\text{mm} - 2 \cdot \left( -\frac{2700\text{mm}}{\sin(30^\circ)} + 5110\text{mm} \right)$$



4) Pivot Centre given Turning Radius of Outer Rear Wheel 

$$fx \quad c = a_{tw} - 2 \cdot \left( -\frac{b}{\tan(\varphi)} + R_{OR} \right)$$

Open Calculator 

$$ex \quad 1352.074\text{mm} = 1999\text{mm} - 2 \cdot \left( -\frac{2700\text{mm}}{\tan(30^\circ)} + 5000\text{mm} \right)$$

5) Wheel Base given Turning Radius of Inner Front Wheel 

$$fx \quad b = \left( R_{IF} + \frac{a_{tw} - c}{2} \right) \cdot \sin(\theta)$$

Open Calculator 

$$ex \quad 3310.035\text{mm} = \left( 4800\text{mm} + \frac{1999\text{mm} - 1300\text{mm}}{2} \right) \cdot \sin(40^\circ)$$

6) Wheel Base given Turning Radius of Inner Rear Wheel 

$$fx \quad b = \left( R_{IR} + \frac{a_{tw} - c}{2} \right) \cdot \tan(\theta)$$

Open Calculator 

$$ex \quad 2726.654\text{mm} = \left( 2900\text{mm} + \frac{1999\text{mm} - 1300\text{mm}}{2} \right) \cdot \tan(40^\circ)$$

7) Wheel Base given Turning Radius of Outer Front Wheel 

$$fx \quad b = \left( R_{OF} - \frac{a_{tw} - c}{2} \right) \cdot \sin(\varphi)$$

Open Calculator 

$$ex \quad 2380.25\text{mm} = \left( 5110\text{mm} - \frac{1999\text{mm} - 1300\text{mm}}{2} \right) \cdot \sin(30^\circ)$$



8) Wheel Base given Turning Radius of Outer Rear Wheel 

$$fx \quad b = \left( R_{OR} - \frac{a_{tw} - c}{2} \right) \cdot \tan(\varphi)$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95\_img.jpg\)](#)

$$ex \quad 2684.967\text{mm} = \left( 5000\text{mm} - \frac{1999\text{mm} - 1300\text{mm}}{2} \right) \cdot \tan(30^\circ)$$

9) Wheel Track given Turning Radius of Inner Front Wheel 

$$fx \quad a_{tw} = 2 \cdot \left( \frac{b}{\sin(\theta)} - R_{IF} \right) + c$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2\_img.jpg\)](#)

$$ex \quad 100.9087\text{mm} = 2 \cdot \left( \frac{2700\text{mm}}{\sin(40^\circ)} - 4800\text{mm} \right) + 1300\text{mm}$$

10) Wheel Track given Turning Radius of Inner Rear Wheel 

$$fx \quad a_{tw} = 2 \cdot \left( \frac{b}{\tan(\theta)} - R_{IR} \right) + c$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7\_img.jpg\)](#)

$$ex \quad 1935.469\text{mm} = 2 \cdot \left( \frac{2700\text{mm}}{\tan(40^\circ)} - 2900\text{mm} \right) + 1300\text{mm}$$

11) Wheel Track given Turning Radius of Outer Front Wheel 

$$fx \quad a_{tw} = 2 \cdot \left( -\frac{b}{\sin(\varphi)} + R_{OF} \right) + c$$

[Open Calculator !\[\]\(899d8b7697d64725bf017d3296cfcf1b\_img.jpg\)](#)

$$ex \quad 720\text{mm} = 2 \cdot \left( -\frac{2700\text{mm}}{\sin(30^\circ)} + 5110\text{mm} \right) + 1300\text{mm}$$



**12) Wheel Track given Turning Radius of Outer Rear Wheel** [Open Calculator](#) 

$$\text{fx } a_{tw} = 2 \cdot \left( -\frac{b}{\tan(\varphi)} + R_{OR} \right) + c$$

$$\text{ex } 1946.926\text{mm} = 2 \cdot \left( -\frac{2700\text{mm}}{\tan(30^\circ)} + 5000\text{mm} \right) + 1300\text{mm}$$





## Variables Used

- $a_{tw}$  Track Width of Vehicle (Millimeter)
- $b$  Wheelbase of Vehicle (Millimeter)
- $c$  Distance between Front Wheel Pivot Center (Millimeter)
- $R_{IF}$  Turning Radius of Inner Front Wheel (Millimeter)
- $R_{IR}$  Turning Radius of Inner Rear Wheel (Millimeter)
- $R_{OF}$  Turning Radius of Outer Front Wheel (Millimeter)
- $R_{OR}$  Turning Radius of Outer Rear Wheel (Millimeter)
- $\theta$  Angle of Inside Wheel Lock (Degree)
- $\varphi$  Angle of Outside Wheel Lock (Degree)







## Constants, Functions, Measurements used

- **Function: sin**,  $\sin(\text{Angle})$   
*Trigonometric sine function*
- **Function: tan**,  $\tan(\text{Angle})$   
*Trigonometric tangent function*
- **Measurement: Length** in Millimeter (mm)  
*Length Unit Conversion* 
- **Measurement: Angle** in Degree ( $^{\circ}$ )  
*Angle Unit Conversion* 



## Check other formula lists

- [Moments, Loads, Angles acting on Steering system and Axles Formulas](#) 
- [Movement Ratio Formulas](#) 
- [Pivot Centre, Wheel Base and Track Formulas](#) 
- [Steering System Formulas](#) 
- [Turning Radius Formulas](#) 

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