calculatoratoz.com

unitsconverters.com

# Length of Valley Curve Formulas

Calculators! Examples! Conversions!

Bookmark **calculatoratoz.com**, **unitsconverters.com**

Widest Coverage of Calculators and Growing - **30,000+ Calculators!**
Calculate With a Different Unit for Each Variable - **In built Unit Conversion!**
Widest Collection of Measurements and Units - **250+ Measurements!**

Feel free to SHARE this document with your friends!

*Please leave your feedback here...*



# List of 20 Length of Valley Curve Formulas

## Length of Valley Curve

## Design of Valley Curve

### 1) Design Speed given Length of Valley Curve

Open Calculator

*fx* $$v = (L_s \cdot R \cdot C_a)^{\frac{1}{3}}$$

ex $$4.09752\text{m/s} = (7\text{m} \cdot 2.34\text{m} \cdot 4.2\text{m/s})^{\frac{1}{3}}$$

### 2) Design Speed given Length of Valley Curve and Time

Open Calculator

*fx* $$v = \frac{L_s}{t}$$

ex $$1.75\text{m/s} = \frac{7\text{m}}{4\text{s}}$$

### 3) Design Speed given Total Length of Valley Curve

Open Calculator

*fx* $$v = \left(\left(\frac{L_s}{2}\right)^2 \cdot \frac{C_a}{N}\right)^{\frac{1}{3}}$$

ex $$3.881214\text{m/s} = \left(\left(\frac{7\text{m}}{2}\right)^2 \cdot \frac{4.2\text{m/s}}{0.88\text{rad}}\right)^{\frac{1}{3}}$$

## 4) Deviation Angle given Total Length of Valley Curve

Open Calculator

fx $$N = \left(\frac{L_s}{2}\right)^2 \cdot \frac{C_a}{v^3}$$

ex $$0.4116\text{rad} = \left(\frac{7\text{m}}{2}\right)^2 \cdot \frac{4.2\text{m/s}}{(5\text{m/s})^3}$$

## 5) Length of Valley Curve

Open Calculator

fx $$L_s = \frac{v^3}{R \cdot C_a}$$

ex $$12.71876\text{m} = \frac{(5\text{m/s})^3}{2.34\text{m} \cdot 4.2\text{m/s}}$$

## 6) Length of Valley Curve given Time and Design Speed

Open Calculator

fx $$L_s = v \cdot t$$

ex $$20\text{m} = 5\text{m/s} \cdot 4\text{s}$$

## 7) Radius of Curve given Length of Valley Curve

Open Calculator

fx $$R = \frac{v^3}{L_s \cdot C_a}$$

ex $$4.251701\text{m} = \frac{(5\text{m/s})^3}{7\text{m} \cdot 4.2\text{m/s}}$$

## 8) Rate of Change of Acceleration

Open Calculator

fx $$C_a = \frac{v^3}{L_s \cdot R}$$

ex $$7.631258\text{m/s} = \frac{(5\text{m/s})^3}{7\text{m} \cdot 2.34\text{m}}$$

## 9) Rate of Change of Acceleration given Total Length of Valley Curve

Open Calculator

fx $$C_a = \left(\frac{L_s}{2}\right)^2 \cdot N \cdot v^3$$

ex $$1347.5\text{m/s} = \left(\frac{7\text{m}}{2}\right)^2 \cdot 0.88\text{rad} \cdot (5\text{m/s})^3$$

## 10) Time given Length of Valley Curve and Design Speed

Open Calculator

fx $$t = \frac{L_s}{v}$$

ex $$1.4\text{s} = \frac{7\text{m}}{5\text{m/s}}$$

### 11) Time given Rate of Change of Acceleration

Open Calculator

fx $$t = \frac{\frac{v^2}{R}}{C_a}$$

ex $$2.543753\text{s} = \frac{\frac{(5\text{m/s})^2}{2.34\text{m}}}{4.2\text{m/s}}$$

### 12) Total Length of Valley Curve

Open Calculator

fx $$L_s = 2 \cdot \sqrt{\frac{N \cdot v^3}{C_a}}$$

ex $$10.23533\text{m} = 2 \cdot \sqrt{\frac{0.88\text{rad} \cdot (5\text{m/s})^3}{4.2\text{m/s}}}$$

## Length of Valley Curve greater than Stopping Sight Distance

### 13) Deviation Angle given Length of Valley Curve Greater than Stopping Sight Distance

Open Calculator

fx $$N = \frac{L_s \cdot \left(2 \cdot h_1 + 2 \cdot S \cdot \tan\left(\alpha_{angle}\right)\right)}{S^2}$$

ex $$0.965823\text{rad} = \frac{7\text{m} \cdot (2 \cdot 0.75\text{m} + 2 \cdot 3.56\text{m} \cdot \tan(2^\circ))}{(3.56\text{m})^2}$$

## 14) Driver Eye Height given Length of Valley Curve Greater than Stopping Sight Distance

Open Calculator

fx $$h_1 = \frac{N \cdot S^2 - 2 \cdot L_s \cdot S \cdot \tan\left(\alpha_{angle}\right)}{2 \cdot L_s}$$

ex $$0.672308\text{m} = \frac{0.88\text{rad} \cdot (3.56\text{m})^2 - 2 \cdot 7\text{m} \cdot 3.56\text{m} \cdot \tan(2^\circ)}{2 \cdot 7\text{m}}$$

## 15) Inclination Angle given Length of Valley Curve Greater than Stopping Sight Distance

Open Calculator

fx $$\alpha_{angle} = a\tan\left(\frac{N \cdot S^2 - 2 \cdot h_1}{2 \cdot S \cdot L_s}\right)$$

ex $$10.96106^\circ = a\tan\left(\frac{0.88\text{rad} \cdot (3.56\text{m})^2 - 2 \cdot 0.75\text{m}}{2 \cdot 3.56\text{m} \cdot 7\text{m}}\right)$$

## 16) Length of Valley Curve Greater than Stopping Sight Distance

Open Calculator

fx $$L_s = \frac{N \cdot S^2}{2 \cdot h_1 + 2 \cdot S \cdot \tan\left(\alpha_{angle}\right)}$$

ex $$6.377982\text{m} = \frac{0.88\text{rad} \cdot (3.56\text{m})^2}{2 \cdot 0.75\text{m} + 2 \cdot 3.56\text{m} \cdot \tan(2^\circ)}$$

# Length of Valley Curve Less than Stopping Sight Distance

## 17) Deviation Angle Given Length of Valley Curve Less than Stopping Sight Distance

Open Calculator

$$N = (2 \cdot S) - \frac{2 \cdot h_1 + \left(2 \cdot S \cdot \tan\left(\alpha_{angle}\right)\right)}{L_s}$$

$$6.870195\text{rad} = (2 \cdot 3.56\text{m}) - \frac{2 \cdot 0.75\text{m} + (2 \cdot 3.56\text{m} \cdot \tan(2^\circ))}{7\text{m}}$$

## 18) Driver Sight Height given Length of Valley Curve Less than Stopping Sight Distance

Open Calculator

$$h_1 = \frac{(L_s - 2 \cdot S) \cdot N + 2 \cdot S \cdot \tan\left(\alpha_{angle}\right)}{2}$$

$$0.071518\text{m} = \frac{(7\text{m} - 2 \cdot 3.56\text{m}) \cdot 0.88\text{rad} + 2 \cdot 3.56\text{m} \cdot \tan(2^\circ)}{2}$$

## 19) Inclination Angle given Length of Valley Curve Less than Stopping Sight Distance

Open Calculator

$$\alpha_{angle} = a\tan\left(\frac{(L_s - 2 \cdot S) \cdot N + 2 \cdot h_1}{2 \cdot S}\right)$$

$$11.08072^\circ = a\tan\left(\frac{(7\text{m} - 2 \cdot 3.56\text{m}) \cdot 0.88\text{rad} + 2 \cdot 0.75\text{m}}{2 \cdot 3.56\text{m}}\right)$$

## 20) Length of Valley Curve Less than Stopping Sight Distance

Open Calculator

fx $$L_s = 2 \cdot S - \frac{2 \cdot h_1 + \left(2 \cdot S \cdot \tan\left(\alpha_{angle}\right)\right)}{N}$$

ex $$5.132914\text{m} = 2 \cdot 3.56\text{m} - \frac{2 \cdot 0.75\text{m} + \left(2 \cdot 3.56\text{m} \cdot \tan\left(2^\circ\right)\right)}{0.88\text{rad}}$$

# Variables Used

- $C_a$ Rate of Change of Acceleration *(Meter per Second)*
- $h_1$ Driver Sight Height *(Meter)*
- $L_s$ Length of Curve *(Meter)*
- **N** Deviation Angle *(Radian)*
- **R** Radius of Curve *(Meter)*
- **S** Sight Distance *(Meter)*
- **t** Time *(Second)*
- **v** Design Speed *(Meter per Second)*
- $\alpha_{angle}$ Inclination *(Degree)*

# Constants, Functions, Measurements used

- Function: **atan**, atan(Number)
  *Inverse trigonometric tangent function*
- Function: **sqrt**, sqrt(Number)
  *Square root function*
- Function: **tan**, tan(Angle)
  *Trigonometric tangent function*
- Measurement: **Length** in Meter (m)
  *Length Unit Conversion*
- Measurement: **Time** in Second (s)
  *Time Unit Conversion*
- Measurement: **Speed** in Meter per Second (m/s)
  *Speed Unit Conversion*
- Measurement: **Angle** in Radian (rad), Degree (°)
  *Angle Unit Conversion*

## Check other formula lists

- **Length of Valley Curve Formulas**

Feel free to SHARE this document with your friends!

## PDF Available in

English Spanish French German Russian Italian Portuguese Polish Dutch

*11/23/2023 | 12:21:59 AM UTC* *Please leave your feedback here...*