



Surveying Vertical Curves Formulas

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List of 19 Surveying Vertical Curves Formulas

Surveying Vertical Curves C
1) Allowable Centrifugal Acceleration given Length C
(x)
$$f = ((g_1) - (g_2)) \cdot \frac{V^2}{100 \cdot L_c}$$
 Open Calculator (
(x) $0.600649m/s^2 = ((2.2) - (-1.5)) \cdot \frac{(100km/h)^2}{100 \cdot 616m}$
(x) $N = L \cdot P_N$ Open Calculator (
(x) $N = L \cdot P_N$ Open Calculator (
(x) $1.4 = 20m \cdot 0.07$
3) Downgrade given Length based on Centrifugal Ratio (
(x) $g_2 = g_1 - \left(L_c \cdot 100 \cdot \frac{f}{V^2}\right)$ Open Calculator (
(x) $g_2 = g_1 - \left(L_c \cdot 100 \cdot \frac{f}{V^2}\right)$
(x) $-1.496 = 2.2 - \left(616m \cdot 100 \cdot \frac{0.6m/s^2}{(100km/h)^2}\right)$



4) Length given S is Less than L and Change of Grade

$$f(\mathbf{L}_{c} = \mathbf{N} \cdot \frac{\mathbf{SD}^{2}}{800 \cdot \mathbf{h}})$$

$$f(\mathbf{L}_{c} = \mathbf{N} \cdot \frac{\mathbf{SD}^{2}}{800 \cdot 1.7\mathbf{m}})$$

$$f(\mathbf{M}_{c} = (\mathbf{M}_{c}) - (\mathbf{M}_{c}) \cdot \frac{\mathbf{M}_{c}^{2}}{800 \cdot 1.7\mathbf{m}})$$

$$f(\mathbf{M}_{c} = ((\mathbf{M}_{1}) - (\mathbf{M}_{c})) \cdot \frac{\mathbf{M}_{c}^{2}}{100 \cdot \mathbf{f}})$$

$$f(\mathbf{M}_{c} = ((\mathbf{M}_{1}) - (\mathbf{M}_{c})) \cdot \frac{\mathbf{M}_{c}^{2}}{100 \cdot \mathbf{f}})$$

$$f(\mathbf{M}_{c} = ((\mathbf{M}_{1}) - (\mathbf{M}_{c})) \cdot \frac{(100\mathbf{km}/\mathbf{h})^{2}}{100 \cdot 0.6\mathbf{m}/\mathbf{s}^{2}})$$

$$f(\mathbf{M}_{c} = (\mathbf{M}_{c}) - ((\mathbf{M}_{c})) \cdot \frac{(100\mathbf{km}/\mathbf{h})^{2}}{100 \cdot 0.6\mathbf{m}/\mathbf{s}^{2}})$$

$$f(\mathbf{M}_{c} = 2 \cdot \mathbf{SD} - (\mathbf{M}_{c}) \cdot \frac{\mathbf{h}}{\mathbf{N}}))$$

$$f(\mathbf{M}_{c} = 2 \cdot \mathbf{SD} - (\mathbf{M}_{c}) \cdot \frac{\mathbf{h}}{\mathbf{N}})$$

$$f(\mathbf{M}_{c} = 2 \cdot \mathbf{SD} - (\mathbf{M}_{c}) \cdot \frac{1.7\mathbf{m}}{3.6})$$

$$f(\mathbf{M}_{c} = 2 \cdot \mathbf{SD} - (\mathbf{M}_{c}) \cdot \frac{\mathbf{h}}{(\mathbf{M}_{c}) - (\mathbf{M}_{c})})$$

$$f(\mathbf{M}_{c} = 2 \cdot \mathbf{SD} - (\mathbf{M}_{c}) \cdot \frac{\mathbf{h}}{(\mathbf{M}_{c}) - (\mathbf{M}_{c})})$$

$$f(\mathbf{M}_{c} = 2 \cdot \mathbf{SD} - (\mathbf{M}_{c}) \cdot \frac{\mathbf{h}}{(\mathbf{M}_{c}) - (\mathbf{M}_{c})})$$

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$$f(\mathbf{M}_{c} = 2 \cdot \mathbf{SD} - (\mathbf{M}_{c}) \cdot \frac{\mathbf{h}}{(\mathbf{M}_{c}) - (\mathbf{M}_{c})})$$

3/10

4/10

Open Calculator

Open Calculator

8) Length of Curve when S is Less than L

$$\label{eq:Lc} \begin{split} \text{fx} & L_c = SD^2 \cdot \frac{(g_1) - (g_2)}{200 \cdot \left(\sqrt{H} + \sqrt{h_2}\right)^2} \\ \text{ex} & 705.2362m = (490m)^2 \cdot \frac{(2.2) - (-1.5)}{200 \cdot \left(\sqrt{1.2m} + \sqrt{2m}\right)^2} \end{split}$$

9) Length of Curve when S is Less than L and h1 and h2 are same

fx
$$\mathrm{L_c} = ((\mathrm{g}_1) - (\mathrm{g}_2)) \cdot rac{\mathrm{SD}^2}{800 \cdot \mathrm{h}}$$

$$653.2132 \mathrm{m} = ((2.2) - (-1.5)) \cdot \frac{(490 \mathrm{m})^2}{800 \cdot 1.7 \mathrm{m}}$$

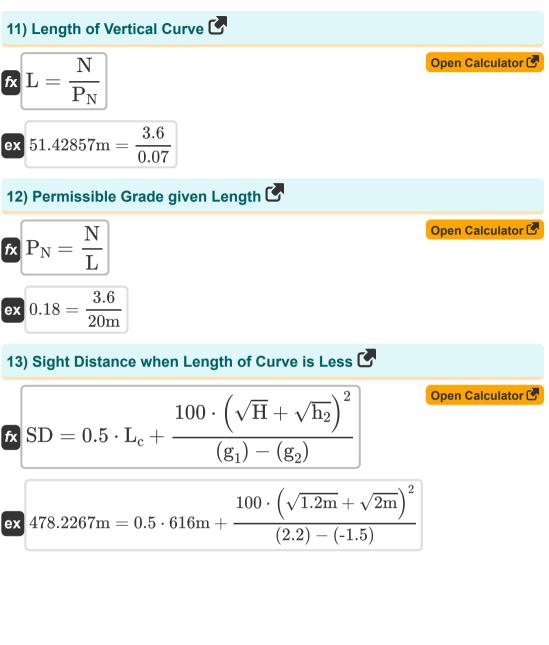
10) Length of Curve when Sight Distance is More

$$\begin{aligned} & \mathbf{fx} \mathbf{L}_{c} = 2 \cdot \mathrm{SD} - \frac{200 \cdot \left(\sqrt{\mathrm{H}} + \sqrt{\mathrm{h}_{2}}\right)^{2}}{(\mathrm{g}_{1}) - (\mathrm{g}_{2})} \\ & \mathbf{ex} \ 639.5467\mathrm{m} = 2 \cdot 490\mathrm{m} - \frac{200 \cdot \left(\sqrt{1.2\mathrm{m}} + \sqrt{2\mathrm{m}}\right)^{2}}{(\mathrm{g}_{1}) - (\mathrm{g}_{2})} \end{aligned}$$



(2.2) - (-1.5)









14) Sight Distance when Length of Curve is Less and Both Height of Observer and Object is Same

15) Sight Distance when S is Less than L 🕑

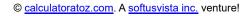
fx
$$\mathrm{S} = \left(rac{1}{\mathrm{c}}
ight) \cdot \left(\sqrt{\mathrm{H}} + \sqrt{\mathrm{h}_2}
ight)$$

ex
$$5.019317 \mathrm{m} = \left(\frac{1}{0.5}\right) \cdot \left(\sqrt{1.2 \mathrm{m}} + \sqrt{2 \mathrm{m}}\right)$$

16) Sight Distance when S is Less than L and h1 and h2 are same 🕑

fx
$$\mathrm{SD} = \sqrt{rac{800 \cdot \mathrm{h} \cdot \mathrm{L_c}}{(\mathrm{g}_1) - (\mathrm{g}_2)}}$$

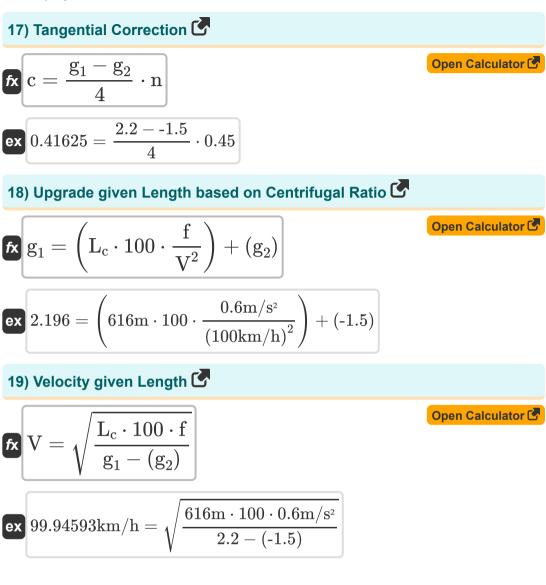
ex
$$475.8378m = \sqrt{\frac{800 \cdot 1.7m \cdot 616m}{(2.2) - (-1.5)}}$$





Open Calculator

Open Calculator 🕑







Variables Used

- C Tangential Correction
- **f** Allowable Centrifugal Acceleration (Meter per Square Second)
- **g₁** Upgrade
- g₂ Downgrade
- h Height of Vertical Curves (Meter)
- H Height of Observer (Meter)
- h₂ Height of Object (Meter)
- L Length of Vertical Curve (Meter)
- L_c Length of Curve (Meter)
- **n** Number of Chords
- N Change in Grade
- P_N Permissible Rate
- S Sight Distance (Meter)
- SD Sight Distance SSD (Meter)
- V Vehicle Velocity (Kilometer per Hour)





Constants, Functions, Measurements used

- Function: **sqrt**, sqrt(Number) Square root function
- Measurement: Length in Meter (m) Length Unit Conversion
- Measurement: **Speed** in Kilometer per Hour (km/h) Speed Unit Conversion
- Measurement: Acceleration in Meter per Square Second (m/s²) Acceleration Unit Conversion



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