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Circular Curves on Highways and Roads Formulas

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List of 27 Circular Curves on Highways and Roads Formulas

Circular Curves on Highways and Roads

1) Approximate Chord Offset for Chord of Length

Open Calculator

fx $$b = \frac{L_c^2}{R_c}$$

ex $$150.7692\text{m} = \frac{(140\text{m})^2}{130\text{m}}$$

2) Central angle for Portion of Curve Approximate for Chord definition

Open Calculator

fx $$d = \frac{D \cdot L_c}{100}$$

ex $$84^\circ = \frac{60^\circ \cdot 140\text{m}}{100}$$

3) Central Angle for Portion of Curve Exact for Arc definition

Open Calculator

fx $$d = \frac{D \cdot L_c}{100}$$

ex $$84^\circ = \frac{60^\circ \cdot 140\text{m}}{100}$$

4) Central Angle of Curve for given Length of Curve

Open Calculator

fx $$I = \frac{L_c \cdot D}{100}$$

ex $$84^\circ = \frac{140\text{m} \cdot 60^\circ}{100}$$

5) Central Angle of Curve for given Length of Long Chord

Open Calculator

fx $$I = \left(\frac{C}{2 \cdot R_c \cdot \sin\left(\frac{1}{2}\right)} \right)$$

ex $$46.42474^\circ = \left(\frac{101\text{m}}{2 \cdot 130\text{m} \cdot \sin\left(\frac{1}{2}\right)} \right)$$

6) Central Angle of Curve for given Tangent Distance

Open Calculator

fx $$I = \left(\frac{T}{\sin\left(\frac{1}{2}\right) \cdot R_c} \right)$$

ex $$45.57898^\circ = \left(\frac{49.58\text{m}}{\sin\left(\frac{1}{2}\right) \cdot 130\text{m}} \right)$$

7) Degree of Curve for given Length of Curve

Open Calculator

$$D = \frac{100 \cdot I}{L_c}$$

$$28.57143^\circ = \frac{100 \cdot 40^\circ}{140\text{m}}$$

8) Degree of Curve for given Radius of Curve

Open Calculator

$$D = \left(\frac{5729.578}{R_c}\right) \cdot \left(\frac{\pi}{180}\right)$$

$$44.07368^\circ = \left(\frac{5729.578}{130\text{m}}\right) \cdot \left(\frac{\pi}{180}\right)$$

9) Degree of Curve when Central Angle for Portion of Curve

Open Calculator

$$D = \frac{100 \cdot d}{L_c}$$

$$64.28571^\circ = \frac{100 \cdot 90^\circ}{140\text{m}}$$

10) Exact Length of Curve

Open Calculator

$$L_c = \frac{100 \cdot I}{D}$$

$$66.66667\text{m} = \frac{100 \cdot 40^\circ}{60^\circ}$$

11) Exact Tangent Distance

Open Calculator

fx $$T = R_c \cdot \tan\left(\frac{1}{2}\right) \cdot I$$

ex $$49.58084\text{m} = 130\text{m} \cdot \tan\left(\frac{1}{2}\right) \cdot 40^\circ$$

12) External Distance

Open Calculator

fx $$E = R_c \cdot \left(\left(\sec\left(\frac{1}{2}\right) \cdot I \cdot \left(\frac{180}{\pi}\right)\right) - 1\right)$$

ex $$5795.368\text{m} = 130\text{m} \cdot \left(\left(\sec\left(\frac{1}{2}\right) \cdot 40^\circ \cdot \left(\frac{180}{\pi}\right)\right) - 1\right)$$

13) Length of Curve given Central Angle for portion of Curve

Open Calculator

fx $$L_c = \frac{d \cdot 100}{D}$$

ex $$150\text{m} = \frac{90^\circ \cdot 100}{60^\circ}$$

14) Length of Curve or Chord by Central Angle given Central Angle for Portion of Curve

Open Calculator

fx $$L_c = \frac{100 \cdot d}{D}$$

ex $$150\text{m} = \frac{100 \cdot 90^\circ}{60^\circ}$$

15) Length of Curve or Chord by Central Angle given Tangent Offset for Chord of Length

Open Calculator

fx $L_c = \sqrt{a \cdot 2 \cdot R_c}$

ex $139.6424\text{m} = \sqrt{75\text{m} \cdot 2 \cdot 130\text{m}}$

16) Length of Curve or Chord determined by Central Angle given Chord Offset for Chord of Length

Open Calculator

fx $L_c = \sqrt{b \cdot R_c}$

ex $139.9679\text{m} = \sqrt{150.7\text{m} \cdot 130\text{m}}$

17) Length of Long Chord

Open Calculator

fx $C = 2 \cdot R_c \cdot \sin\left(\left(\frac{1}{2}\right) \cdot (I)\right)$

ex $88.92524\text{m} = 2 \cdot 130\text{m} \cdot \sin\left(\left(\frac{1}{2}\right) \cdot (40^\circ)\right)$

18) Radius of Curve

Open Calculator

fx $R_c = \frac{5729.578}{D \cdot \left(\frac{180}{\pi}\right)}$

ex $95.49297\text{m} = \frac{5729.578}{60^\circ \cdot \left(\frac{180}{\pi}\right)}$

19) Radius of Curve Exact for Chord

Open Calculator

$$R_c = \frac{50}{\sin\left(\frac{1}{2}\right) \cdot (D)}$$

$$99.59103\text{m} = \frac{50}{\sin\left(\frac{1}{2}\right) \cdot (60^\circ)}$$

20) Radius of Curve given Chord offset for Chord of Length

Open Calculator

$$R_c = \frac{L_c^2}{b}$$

$$130.0597\text{m} = \frac{(140\text{m})^2}{150.7\text{m}}$$

21) Radius of Curve given Length of Long Chord

Open Calculator

$$R_c = \frac{C}{2 \cdot \sin\left(\frac{1}{2}\right) \cdot (I)}$$

$$150.8804\text{m} = \frac{101\text{m}}{2 \cdot \sin\left(\frac{1}{2}\right) \cdot (40^\circ)}$$

22) Radius of Curve given Tangent offset for Chord of Length

Open Calculator

fx $$R_c = \frac{L_c^2}{2 \cdot a}$$

ex $$130.6667\text{m} = \frac{(140\text{m})^2}{2 \cdot 75\text{m}}$$

23) Radius of Curve using Degree of Curve

Open Calculator

fx $$R_c = \frac{50}{\sin\left(\frac{1}{2}\right) \cdot (D)}$$

ex $$99.59103\text{m} = \frac{50}{\sin\left(\frac{1}{2}\right) \cdot (60^\circ)}$$

24) Radius of Curve using External Distance

Open Calculator

fx $$R_c = \frac{E}{\left(\sec\left(\frac{1}{2}\right) \cdot \left(I \cdot \left(\frac{180}{\pi}\right)\right)\right) - 1}$$

ex $$129.9917\text{m} = \frac{5795\text{m}}{\left(\sec\left(\frac{1}{2}\right) \cdot \left(40^\circ \cdot \left(\frac{180}{\pi}\right)\right)\right) - 1}$$

25) Radius of Curve using Midordinate

Open Calculator

fx $$R_c = \frac{M}{1 - \left(\cos\left(\frac{1}{2}\right) \cdot (I)\right)}$$

ex $$130.3792\text{m} = \frac{50.5\text{m}}{1 - \left(\cos\left(\frac{1}{2}\right) \cdot (40^\circ)\right)}$$

26) Radius of Curve using Tangent Distance

Open Calculator

fx $$R_c = \frac{T}{\sin\left(\frac{1}{2}\right) \cdot (I)}$$

ex $$148.1317\text{m} = \frac{49.58\text{m}}{\sin\left(\frac{1}{2}\right) \cdot (40^\circ)}$$

27) Tangent Offset for Chord of Length

Open Calculator

fx $$a = \frac{L_c^2}{2 \cdot R_c}$$

ex $$75.38462\text{m} = \frac{(140\text{m})^2}{2 \cdot 130\text{m}}$$

Variables Used

- **a** Tangent Offset *(Meter)*
- **b** Chord Offset *(Meter)*
- **C** Length of long Chord *(Meter)*
- **d** Central Angle for Portion of Curve *(Degree)*
- **D** Degree of Curve *(Degree)*
- **E** External Distance *(Meter)*
- **I** Central Angle of Curve *(Degree)*
- L_c Length of Curve *(Meter)*
- **M** Midordinate *(Meter)*
- R_c Radius of Circular Curve *(Meter)*
- **T** Tangent Distance *(Meter)*

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Function: **cos**, cos(Angle)
  Trigonometric cosine function
- Function: **sec**, sec(Angle)
  Trigonometric secant function
- Function: **sin**, sin(Angle)
  Trigonometric sine function
- Function: **sqrt**, sqrt(Number)
  Square root function
- Function: **tan**, tan(Angle)
  Trigonometric tangent function
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Angle** in Degree (°)
  Angle Unit Conversion

Check other formula lists

- **Circular Curves on Highways and Roads Formulas**

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