



Transition Curves Surveying Formulas

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Examples!

Conversions!

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List of 21 Transition Curves Surveying Formulas

Transition Curves Surveying

Length of Transition Curve C

1) Hands-Off Velocity

fx $\mathbf{v} = \sqrt{\mathbf{g}\cdot\mathbf{R}\cdot an(\mathbf{ heta})}$

ex
$$13.3546 \mathrm{m/s} = \sqrt{9.8 \mathrm{m/s^2} \cdot 50 \mathrm{m} \cdot \mathrm{tan}(20\degree)}$$

2) Length given Angle of Super Elevation 🕑

fx
$$L_{a} = (g \cdot tan(\theta_{e}))^{1.5} \cdot rac{\sqrt{R_{Curve}}}{\alpha}$$

x
$$146.2214\mathrm{m} = (9.8\mathrm{m/s^2} \cdot \mathrm{tan}(95.4))^{1.5} \cdot rac{\sqrt{200\mathrm{m}}}{10\mathrm{m/s^2}}$$

3) Length of Transition Curve given Shift 🕑

fx
$$L_{a} = \sqrt{S \cdot 24 \cdot R_{Curve}}$$
 ex $120m = \sqrt{3m \cdot 24 \cdot 200m}$

e



Open Calculator

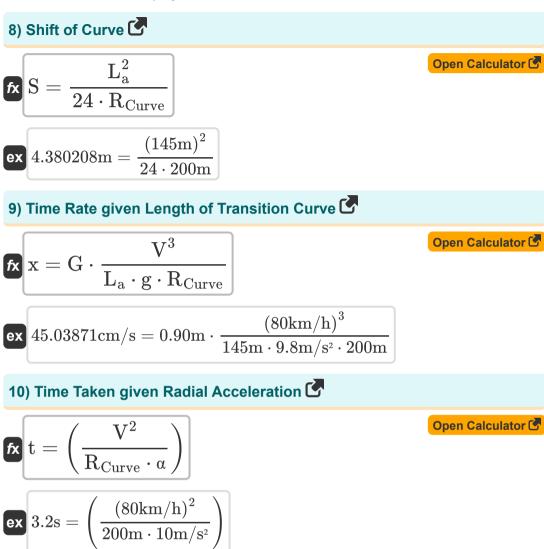
Open Calculator

Open Calculator

3/114) Length of Transition Curve given Time Rate I(a) Length of Transition Curve given Time Rate I(a) La = G
$$\cdot \frac{V^3}{x \cdot g \cdot R_{Curve}}$$
(b) La = G $\cdot \frac{V^3}{x \cdot g \cdot R_{Curve}}$ (c) 108.8435m = 0.90m $\cdot \frac{(80 \text{km/h})^3}{60 \text{cm/s} \cdot 9.8 \text{m/s}^2 \cdot 200 \text{m}}$ (c) Length when Comfort Condition Holds Good for Highways I(c) La = 12.80 $\cdot \sqrt{R_{Curve}}$ (c) La = 12.80 $\cdot \sqrt{R_{Curve}}$ (c) La = 12.80 $\cdot \sqrt{200 \text{m}}$ (c) La = 12.80 $\cdot \sqrt{200 \text{m}}$ (c) La = 4.52 $\cdot \sqrt{R_{Curve}}$ (c) La = 4.52 $\cdot \sqrt{R_{Curve}}$ (c) La = 4.52 $\cdot \sqrt{R_{Curve}}$ (c) Gas 0.92245m = 4.52 $\cdot \sqrt{200 \text{m}}$ (c) Gas 0.92245m = 4.52 $\cdot \sqrt{200 \text{m}}$ (c) $\alpha = \left(\frac{V^2}{R_{Curve} \cdot t}\right)$ (c) $\alpha = \left(\frac{(80 \text{km/h})^2}{200 \text{m} \cdot 3.2 \text{s}}\right)$

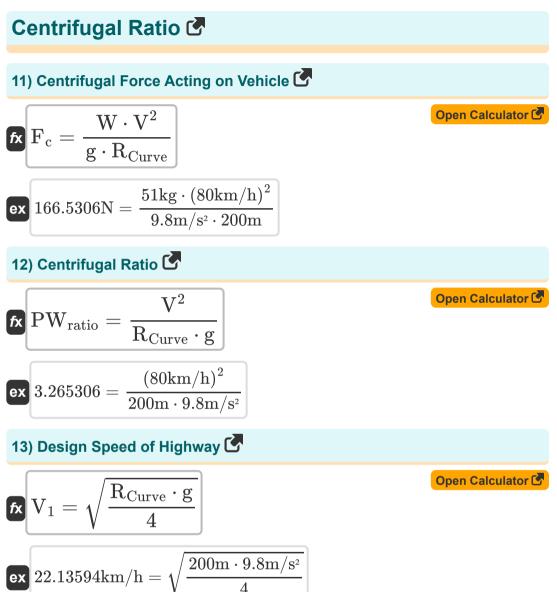
















14) Design Speed of Railway

$$v_2 = \sqrt{R_{Curve} \cdot \frac{g}{8}}$$

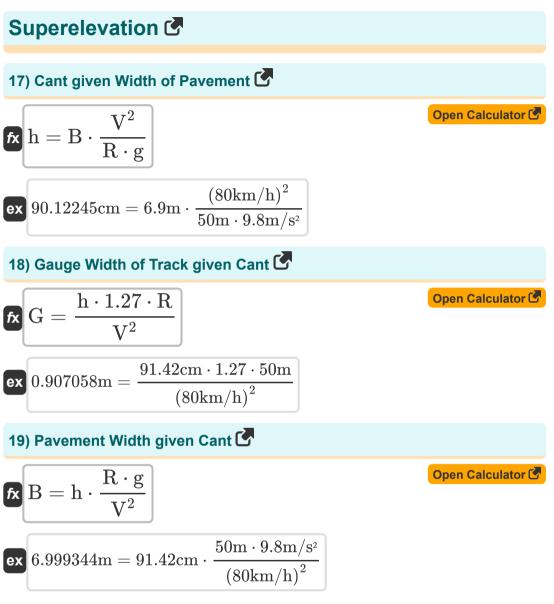
 $v_2 = \sqrt{R_{Curve} \cdot \frac{g}{8}}$
 $4.34791m/s = \sqrt{200m \cdot \frac{9.8m/s^2}{8}}$
15) Radius of Curve given Centrifugal Force
 $R_{Curve} = \frac{W \cdot V^2}{g \cdot F_c}$
 $204.332m = \frac{51kg \cdot (80km/h)^2}{9.8m/s^2 \cdot 163N}$
16) Speed of Vehicle given Centrifugal Force
 $V = \sqrt{F_c \cdot g \cdot \frac{R_{Curve}}{W}}$
Open Calculator
N (Speed of Vehicle given Centrifugal Force
Open Calculator
Open Calcu

ex
$$79.14742 \mathrm{km/h} = \sqrt{163 \mathrm{N} \cdot 9.8 \mathrm{m/s^2} \cdot \frac{200 \mathrm{m}}{51 \mathrm{kg}}}$$



i

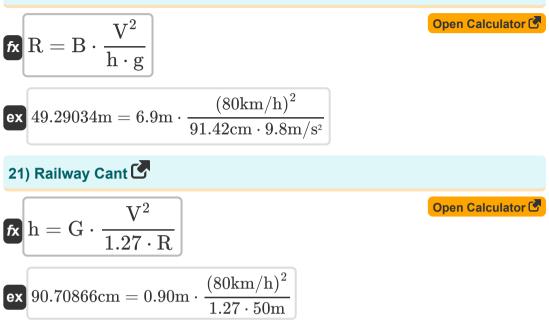








20) Radius of Curve given Cant for Road 🖸







Variables Used

- **B** Pavement Width (*Meter*)
- **F**_c Centrifugal Force (Newton)
- g Acceleration due to Gravity (Meter per Square Second)
- **G** Railway Gauge (Meter)
- **h** Cant (Centimeter)
- La Transition Curve Length (Meter)
- PWratio Centrifugal Ratio
- **R** Radius of Curve (Meter)
- Rcurve Curve Radius (Meter)
- S Shift (Meter)
- t Time taken to Travel (Second)
- V Hands off Velocity (Meter per Second)
- V Vehicle Velocity (Kilometer per Hour)
- V₁ Design Speed on Highways (Kilometer per Hour)
- V2 Design Speed on Railways (Meter per Second)
- W Weight of Vehicle (Kilogram)
- X Super Elevation Time Rate (Centimeter per Second)
- α Rate of Radial Acceleration (Meter per Square Second)
- **θ** Angle of Super Elevation (Degree)
- θ_e Super Elevation Angle



Constants, Functions, Measurements used

- Function: **sqrt**, sqrt(Number) Square root function
- Function: tan, tan(Angle) Trigonometric tangent function
- Measurement: Length in Meter (m), Centimeter (cm) Length Unit Conversion
- Measurement: Weight in Kilogram (kg) Weight Unit Conversion
- Measurement: Time in Second (s)
 Time Unit Conversion
- Measurement: Speed in Meter per Second (m/s), Kilometer per Hour (km/h), Centimeter per Second (cm/s)
 Speed Unit Conversion
- Measurement: Acceleration in Meter per Square Second (m/s²) Acceleration Unit Conversion
- Measurement: Force in Newton (N) Force Unit Conversion
- Measurement: Angle in Degree (°) Angle Unit Conversion



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