

Middle Ordinates of Curves in 10' Chord & 30' Rail

FORMULA FOR CALCULATING MIDDLE ORDINATES

R = Radius of curvature in feet.

C = Length of chord in feet.

L = Length of arc (or rail) in feet.

M.O. = Middle ordinate in inches.

a = Included angle in degrees, minutes and seconds of chord C or arc L.

$$\text{M.O.} = 12 R (1 - \cos \frac{a}{2}) \text{ Theoretical.}$$

$$\text{M.O.} = 12 (R - \sqrt{R^2 - \frac{C^2}{4}}) \text{ Theoretical.}$$

$$\text{M.O.} = \frac{L^2}{R} (1.5 - \frac{L^2}{32R^2}) \text{ approximate.}$$

Formula gives results within practical limits for radii longer than the arc length.

For standard rail lengths, second term ($\frac{L^2}{32R^2}$) may be omitted for radii longer than 100 feet.

$$\text{M.O.} = \frac{1.5C^2}{R} \text{ approximate.}$$

Formula gives results within practical limits for chords shorter than 20' and radii longer than 60'.

Radius	10' Ch.	30' Rail	Radius	10' Ch.	30' Rail	Radius	10' Ch.	30' Rail
25'	6 1/16"	4'- 4 7/16"	45'	3 11/32"	2'- 5 3/4"	80'	1 7/8"	1'- 4 13/16"
26'	5 13/16"	4'- 2 1/2"	46'	3 9/32"	2'- 5 1/8"	82'	1 27/32"	1'- 4 3/8"
27'	5 5/8"	4'- 0 3/4"	47'	3 7/32"	2'- 4 1/2"	84'	1 13/16"	1'- 4"
28'	5 13/32"	3'- 11 1/32"	48'	3 5/32"	2'- 3 7/8"	86'	1 3/4"	1'- 3 5/8"
29'	5 7/32"	3'- 9 1/2"	49'	3 1/16"	2'- 3 5/16"	88'	1 11/16"	1'- 3 5/16"
30'	5 1/32"	3'- 8 1/16"	50'	3"	2'- 2 3/4"	90'	1 21/32"	1'- 3"
31'	4 27/32"	3'- 6 3/4"	52'	2 7/8"	2'- 1 13/16"	95'	1 19/32"	1'- 2 3/16"
32'	4 23/32"	3'- 5 7/16"	54'	2 25/32"	2'- 0 7/8"	100'	1 1/2"	1'- 1 1/2"
33'	4 9/16"	3'- 4 3/16"	56'	2 11/16"	2'- 0"	110'	1 3/8"	1'- 0 1/4"
34'	4 7/16"	3'- 3 1/16"	58'	2 9/16"	1'- 11 1/8"	120'	1 1/4"	0'- 11 1/4"
35'	4 5/16"	3'- 2"	60'	2 1/2"	1'- 10 3/8"	130'	1 1/8"	0'- 10 3/8"
36'	4 3/16"	3'- 0 15/16"	62'	2 7/16"	1'- 9 5/8"	140'	1 1/16"	0'- 9 5/8"
37'	4 1/16"	3'- 0"	64'	2 11/32"	1'- 9"	150'	1"	0'- 9"
38'	3 15/16"	2'- 11 1/16"	66'	2 9/32"	1'- 8 1/4"	160'	0 15/16"	0'- 8 7/16"
39'	3 27/32"	2'- 10 3/16"	68'	2 7/32"	1'- 7 3/4"	170'	0 29/32"	0'- 7 7/8"
40'	3 3/4"	2'- 9 3/8"	70'	2 5/32"	1'- 7 1/4"	180'	0 13/16"	0'- 7 9/16"
41'	3 21/32"	2'- 8 9/16"	72'	2 3/32"	1'- 6 11/16"	190'	0 25/32"	0'- 7 1/8"
42'	3 19/32"	2'- 7 13/16"	74'	2 1/32"	1'- 6 3/16"	200'	0 3/4"	0'- 6 3/4"
43'	3 1/2"	2'- 7 1/16"	76'	1 31/32"	1'- 5 3/4"			
44'	3 13/32"	2'- 6 3/8"	78'	1 15/16"	1'- 5 1/4"			

