Continuous Beam by the Three-Moment Equation

Support moments and reactions of a continuous beam of two or three spans with uniform loads and simple end supports, by Clapeyron's three-moment equation.

Method: Clapeyron's three-moment equation

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of spans	Three spans	
Span 1 length	6.0000	m
Span 2 length	8.0000	m
Span 3 length	6.0000	m
Span 1 uniform load	20.000	kN/m
Span 2 uniform load	25.000	kN/m
Span 3 uniform load	20.000	kN/m

Calculated results

Parameter	Value	Unit
Moment at support 1 (hogging negative)	-118.89	kN·m
Moment at support 2 (zero for two spans)	-118.89	kN·m
End reaction at support 0	40.185	kN
Reaction at support 1	179.81	kN
Reaction at support 2	179.81	kN
End reaction at support 3 (three spans)	40.185	kN

Notes for this case

• For each interior support the three-moment equation M_{i−1}L_i + 2M_i(L_i + L_{i+1}) + M_{i+1}L_{i+1} = −(w_iL_i³ + w_{i+1}L_{i+1}³)/4 links the moments at three consecutive supports of a beam with constant EI on unyielding supports. With simply supported ends (M = 0) two spans give one equation and three spans two. Each span's end shears are wL/2 plus or minus the difference of its end moments over its length, and support reactions add the shears from both sides. For pattern loading, run the calculator with the live load on alternate spans.

Formula and method

$$M_{i-1}L_i + 2M_i(L_i + L_{i+1}) + M_{i+1}L_{i+1} = -\frac{w_i L_i^3 + w_{i+1} L_{i+1}^3}{4}$$

Variables

n	Number of spans	-
L_1	Span 1 length	m
L_2	Span 2 length	m
L_3	Span 3 length	m
w_1	Span 1 uniform load	N/m
w_2	Span 2 uniform load	N/m
w_3	Span 3 uniform load	N/m
M_1	Moment at support 1 (hogging negative)	N·m
M_2	Moment at support 2 (zero for two spans)	N·m

R_0	End reaction at support 0	N
R_1	Reaction at support 1	N
R_2	Reaction at support 2	N
R_3	End reaction at support 3 (three spans)	N

Method and standards

Three-moment equation.

Assumptions and limits

- Constant EI; unyielding supports; simple ends; uniform loads.

References

Clapeyron's three-moment equation

Report details

Report reference	FCC-GVZ3-AQ2H (the same inputs always give the same reference)
Generated	23 November 2026, 18:08 UTC
Calculator	Continuous Beam by the Three-Moment Equation
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/civil/steel/three-moment-equation

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.