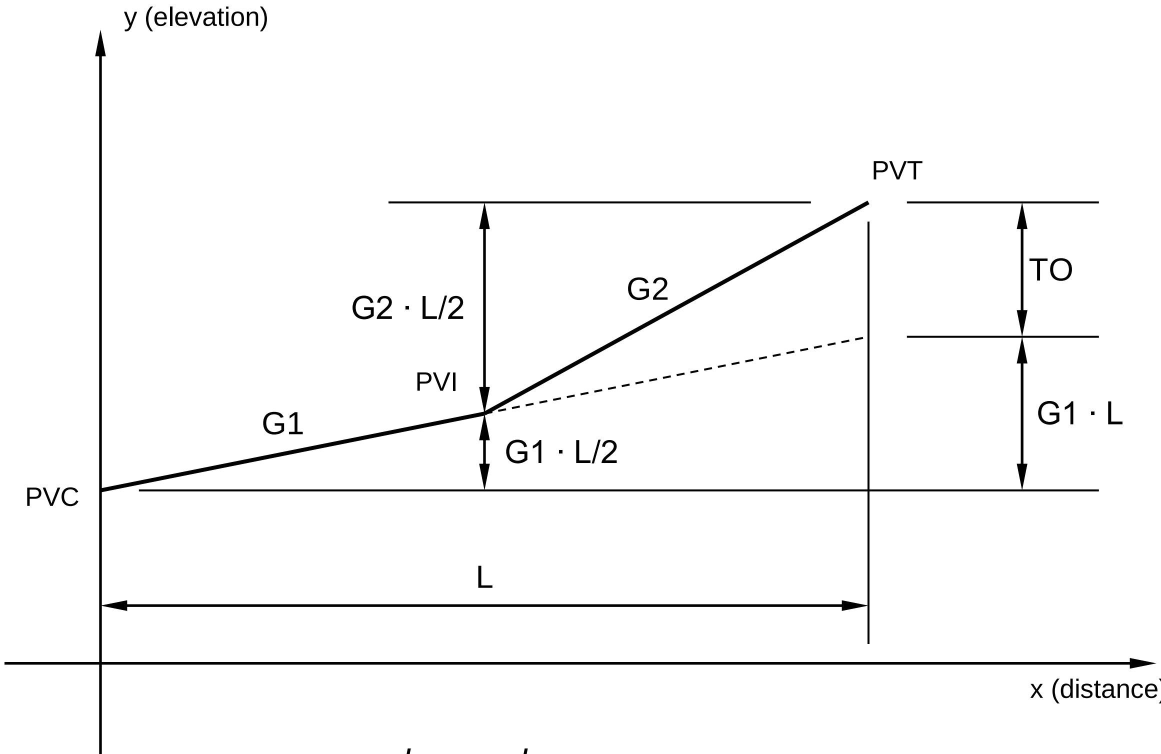


$$G1 \cdot \frac{L}{2} + G2 \cdot \frac{L}{2} = G1 \cdot L + TO$$

$$TO = G2 \cdot \frac{L}{2} + G1 \cdot \frac{L}{2} - G1 \cdot L$$

$$TO = G2 \cdot \frac{L}{2} - G1 \cdot \frac{L}{2}$$

$$TO = \frac{L}{2} \cdot (G2 - G1)$$

Linear: $y = B \cdot x + C$

New Elev = Grade x Dist + Elev

Quadratic: $y = A \cdot x^2 + B \cdot x + C$

New Elev = TO + Grade x Dist + PVC Elev

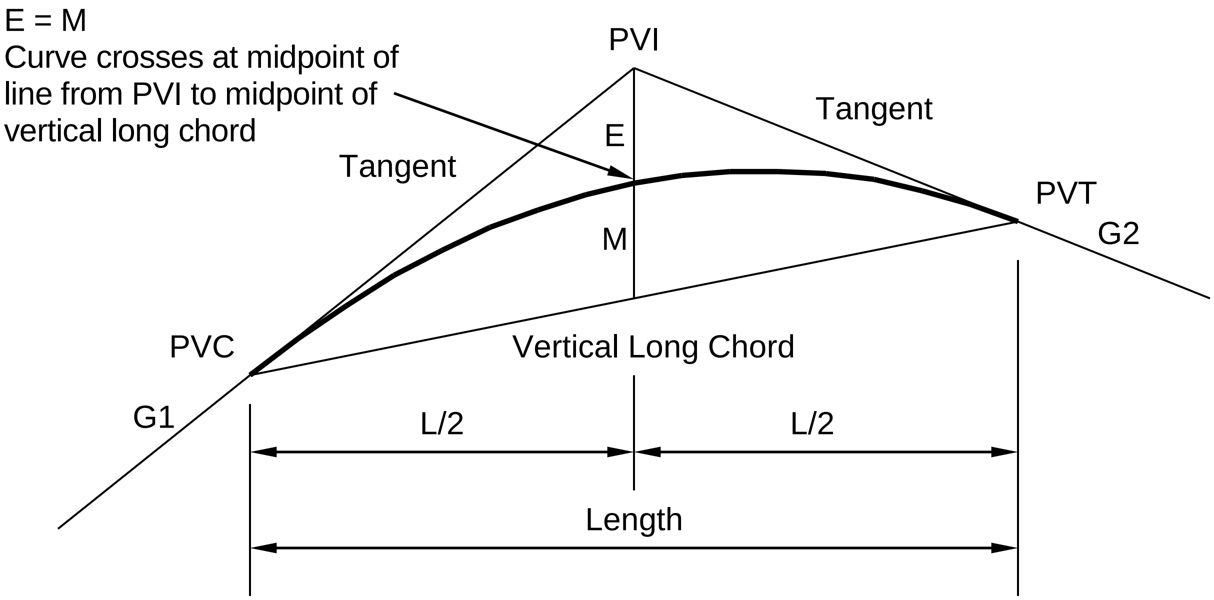
$$A \cdot x^2 = \frac{L}{2} \cdot (G2 - G1) \qquad A = \frac{L}{2 \cdot x^2} \cdot (G2 - G1)$$

Since x = L …

$$A = \frac{(G2 - G1)}{2 \cdot L}$$

Note: $r = \frac{(G2 - G1)}{L} = 2 \cdot A$

$$B = G1$$



PVC	=	Point of Vertical Curvature	
PVI	=	Point of Vertical Intersection	
PVT	=	Point of Vertical Tangency	
E	=	External Secant	
M	=	Middle Ordinate	
G1	=	Grade 1,	Entering Gradient
G2	=	Grade 2,	Exiting Gradient

To solve for the tangent offset distance at any station (STA) along the tangent:

Entering Curve: $$\text{Tangent Offset} = E \cdot \left(\frac{STA - PVCsta}{PVIsta - PVCsta} \right)^2$$

Exiting Curve: $$\text{Tangent Offset} = E \cdot \left(\frac{PVTsta - STA}{PVTsta - PVIsta} \right)^2$$

PROPERTIES
of
SYMMETRICAL or EQUAL TANGENT
VERTICAL CURVES

1. “M” = “E”
   That is to say that the curve lies midway (vertically) between
   the elevation of the PVI and the elevation of the midpoint of the “chord”.

2. Offsets from the two straight grade lines are symmetrical
   on either side of the PVI. Equal distances yield equal tangent offsets.

3. Tangent offsets from either grade line vary
   with the square of the distance from the point of tangency of that grade line.