We shall prove the relation between the linear thermal expansion and the volumetric thermal expansion (assuming the material is isotropic).

$$\alpha_V = \frac{1}{V}\cdot\frac{dV}{dT} = \frac{1}{L^3}\cdot\frac{(L + dL)^3 - L^3}{dT} = \frac{3}{(L\cdot dT)}\cdot dL + \frac{3}{\left(L^2\cdot dT\right)}\cdot dL^2 + \frac{1}{\left(L^3\cdot dT\right)}\cdot dL^3$$

We will now neglect the second and third order differentials.......

$$\alpha_V = \frac{3}{(L\cdot dT)}\cdot dL = 3\cdot\alpha_L$$