

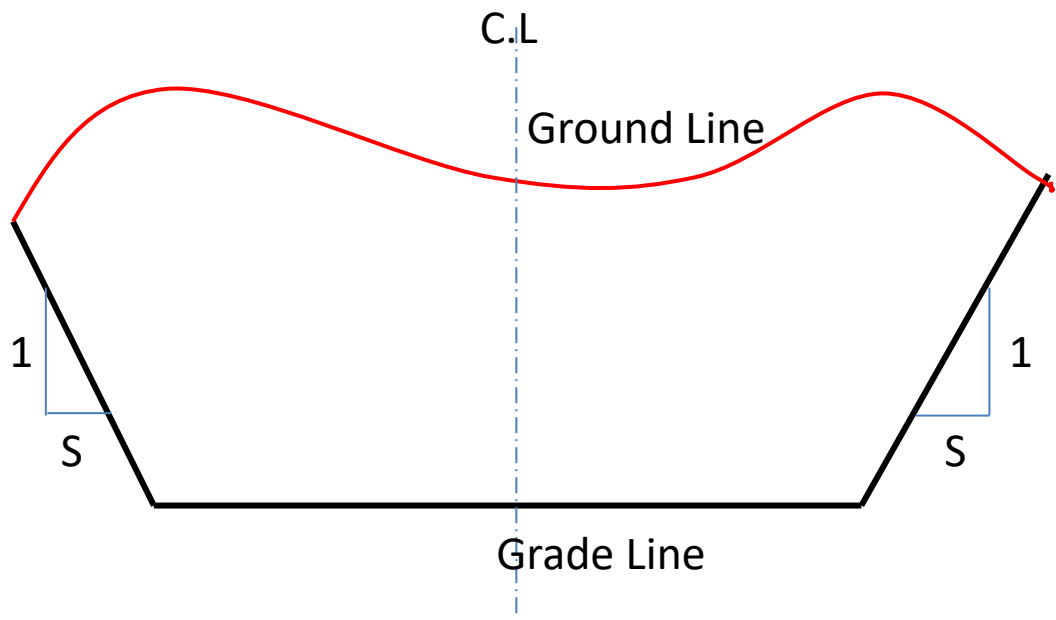
# Engineering Surveying

## 3<sup>rd</sup> Stage

### Area of Cross – Section

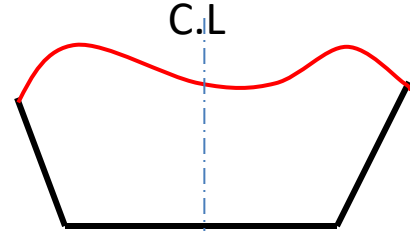
Luma Khalid

E-mail : [luma.k@coeng.uobaghdad .edu.iq](mailto:luma.k@coeng.uobaghdad.edu.iq)

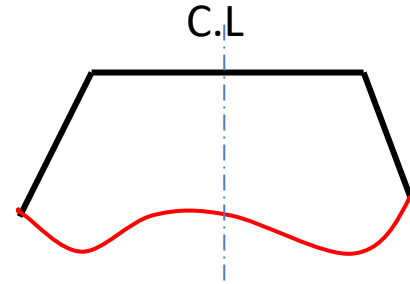


# اشكال المقاطع العرضية

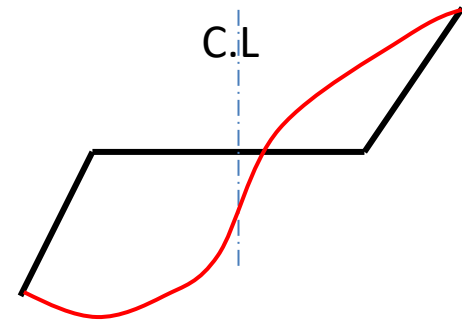
- Cut Section



- Fill Section

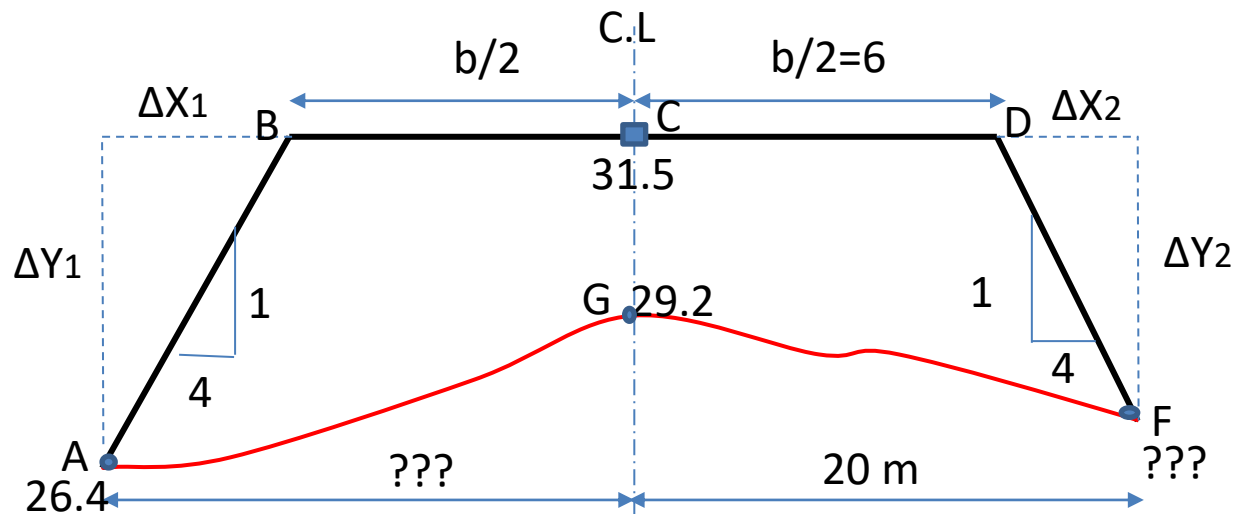


- Side – Hill Section



# Computation of Elevation & Distance

- Compute missing Elevation & Distance of cross section

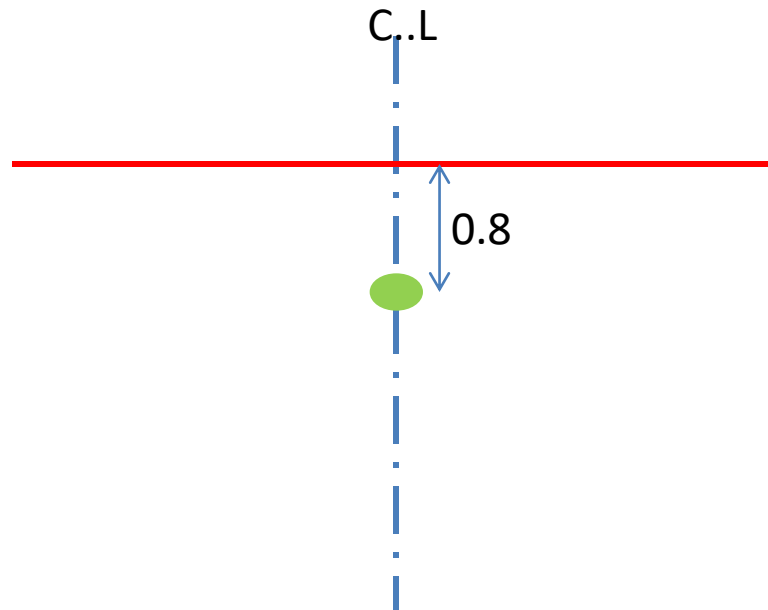


# Computation of Elevation & Distance

- $\Delta X_2 = 20 - 6 = 14 \text{ m}$
- $\frac{1}{4} = \frac{\Delta Y}{\Delta X}$
- $\frac{1}{4} = \frac{\Delta Y_2}{14}$
- $\Delta Y_2 = 3.5 \text{ m}$
- Elevation point F =  $31.5 - 3.5 = 28.00 \text{ m}$
- $\Delta Y_1 = 31.5 - \text{Elevation point A} = 31.5 - 26.4 = 5.10 \text{ m}$
- $\frac{1}{4} = \frac{\Delta Y_1}{\Delta X_1} = \frac{5.10}{\Delta X_1}$
- $\Delta X_1 = 20.4 \text{ m}$
- Distance from A to G =  $\Delta X_1 + b/2 = 20.4 + 6 = 26.4 \text{ m}$

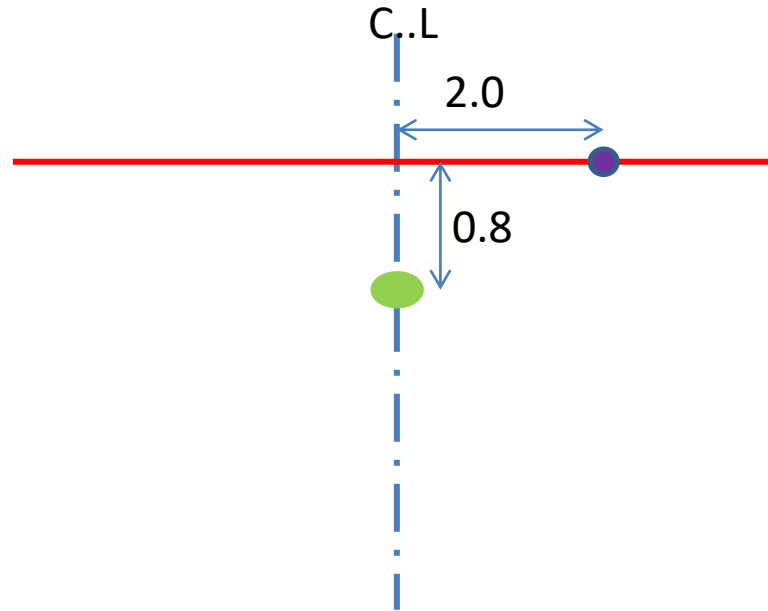
# Draw of cross- section

$$\frac{f?}{12} \quad , \quad \frac{f3}{3.5} \quad , \quad \frac{f0.8}{0.00} \quad , \quad \frac{0.00}{2.0} \quad , \quad \frac{c2}{4.0} \quad , \quad \frac{c4}{?}$$



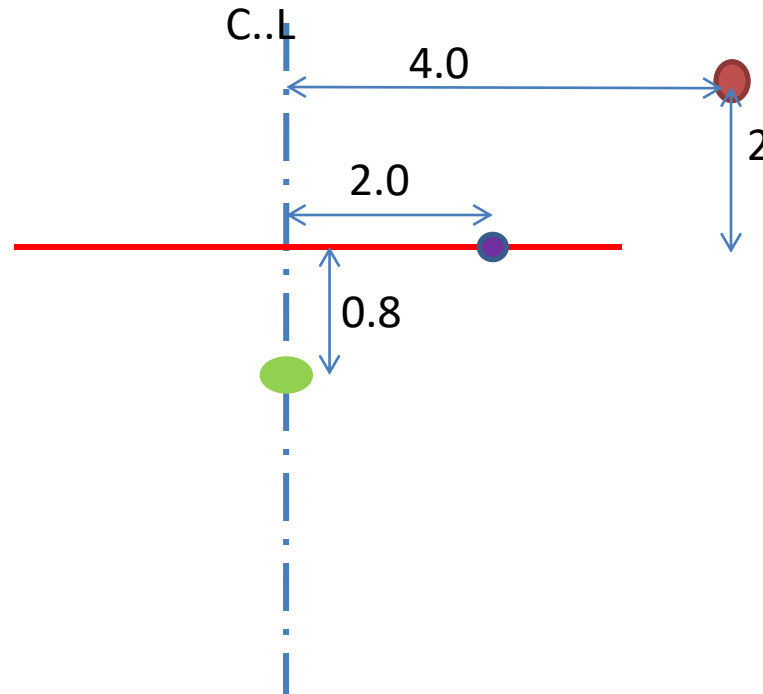
# Draw of cross- section

- $\frac{f?}{12}$  ,  $\frac{f3}{3.5}$  ,  $\frac{f0.8}{0.00}$  ,  $\frac{0.00}{2.0}$  ,  $\frac{c2}{4.0}$  ,  $\frac{c4}{?}$



# Draw of cross- section

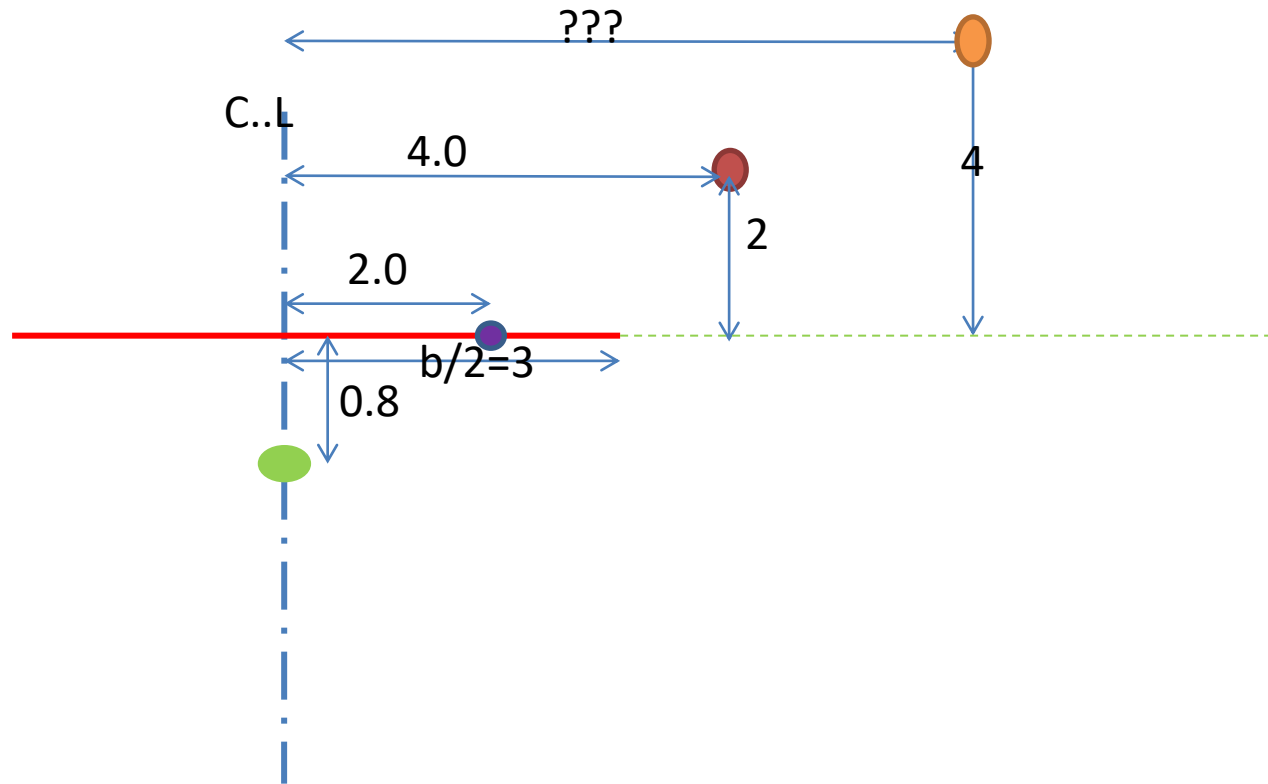
$$\frac{f?}{12} \quad , \quad \frac{f3}{3.5} \quad , \quad \frac{f0.8}{0.00} \quad , \quad \frac{0.00}{2.0} \quad , \quad \frac{c2}{4.0} \quad , \quad \frac{c4}{?}$$





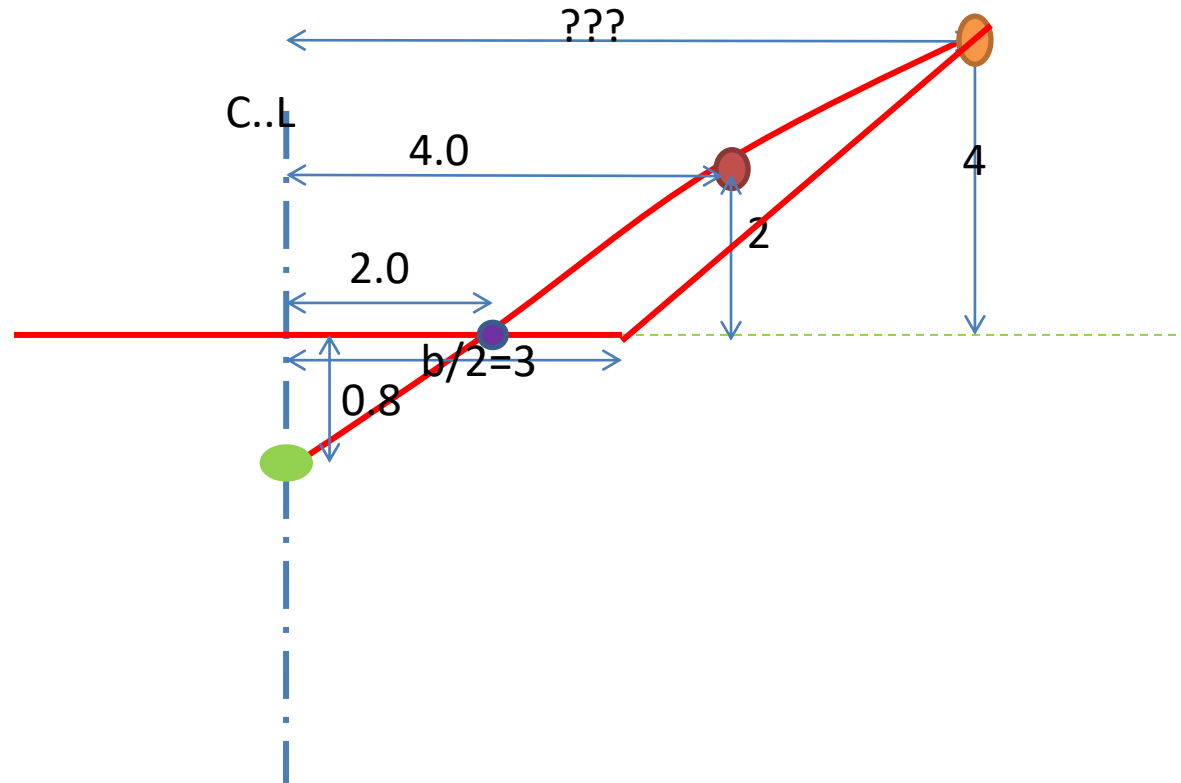
# Draw of cross- section

- $\frac{f?}{12}$  ,  $\frac{f3}{3.5}$  ,  $\frac{f0.8}{0.00}$  ,  $\frac{0.00}{2.0}$  ,  $\frac{c2}{4.0}$  ,  $\frac{c4}{?}$



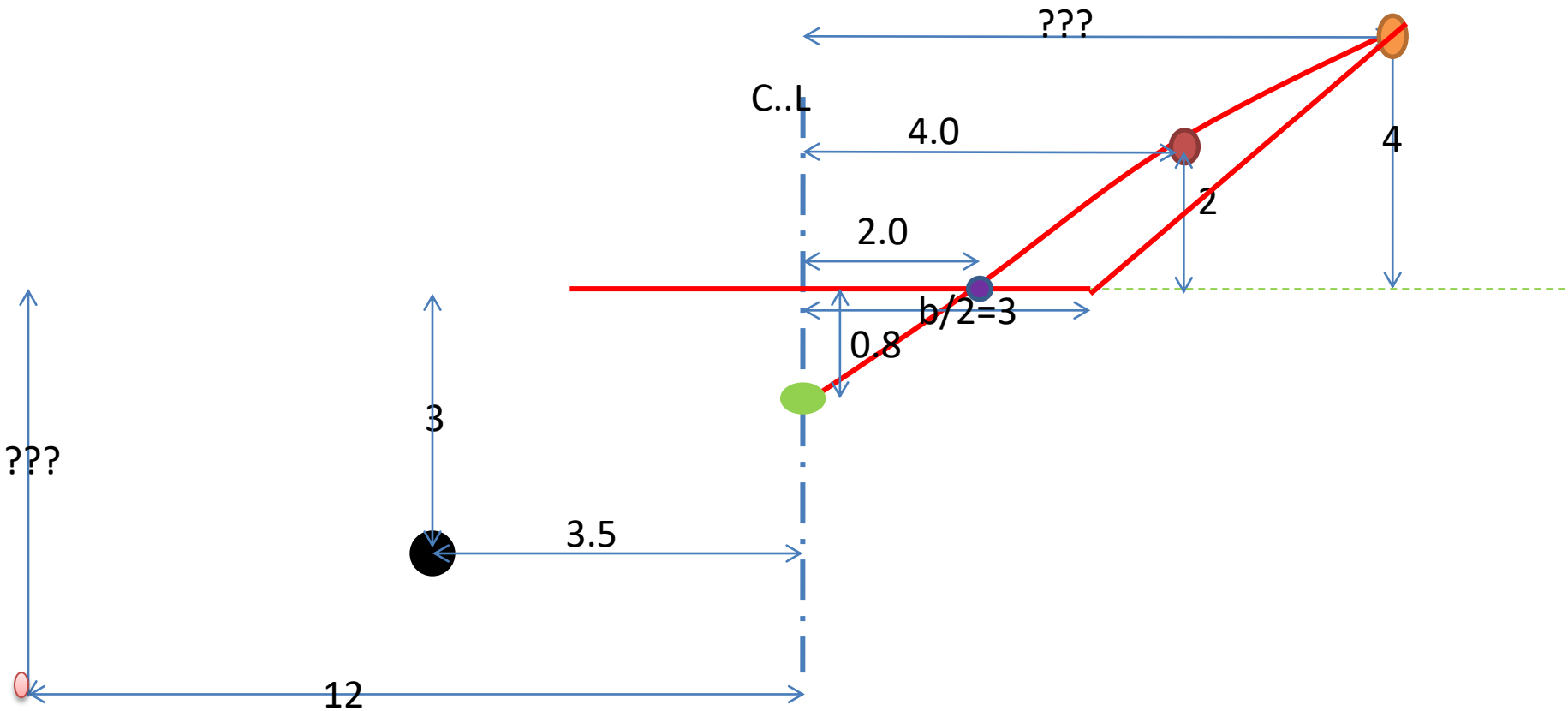
# Draw of cross- section

$$\frac{f?}{12} \quad , \quad \frac{f3}{3.5} \quad , \quad \frac{f0.8}{0.00} \quad , \quad \frac{0.00}{2.0} \quad , \quad \frac{c2}{4.0} \quad , \quad \frac{c4}{?}$$



# Draw of cross- section

- $\frac{f?}{12}$  ,  $\frac{f3}{3.5}$  ,  $\frac{f0.8}{0.00}$  ,  $\frac{0.00}{2.0}$  ,  $\frac{c2}{4.0}$  ,  $\frac{c4}{?}$



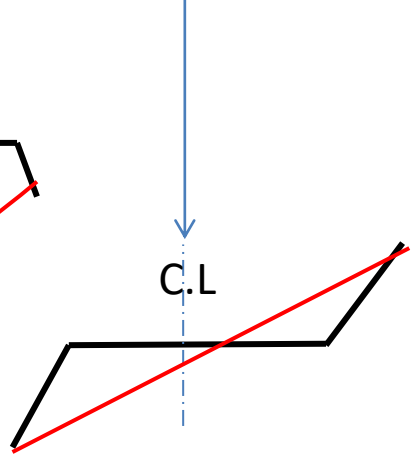
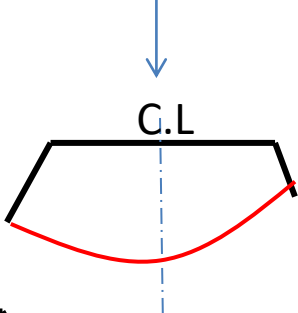
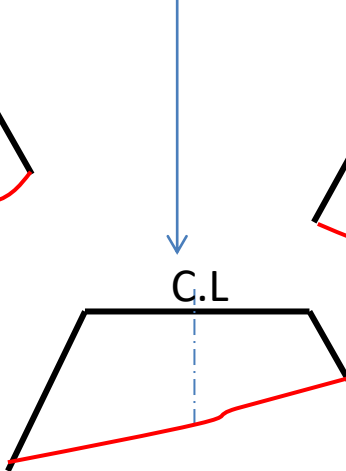
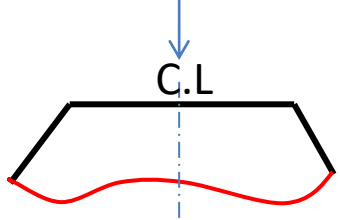
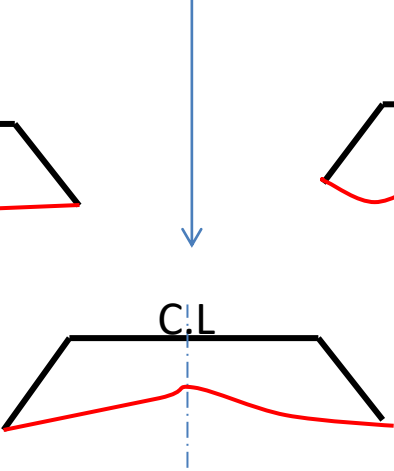
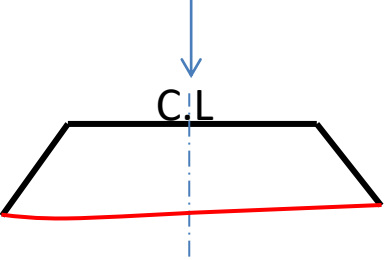




# Arithmetic Means

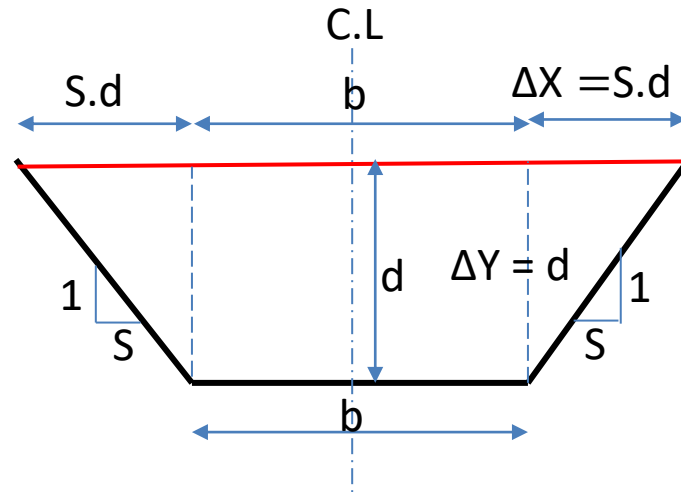
Shape of ground

- Fora level section
- fora three level section
- fora Multi level section
- One slope
- Two slope
- One slope Side – Hill



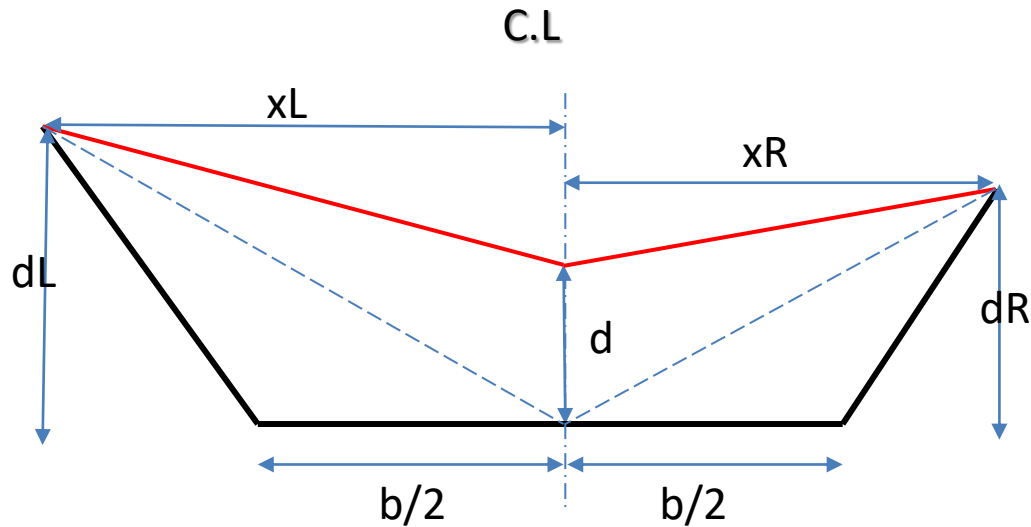
# Fora level section

- $\frac{1}{s} = \frac{\Delta Y}{\Delta X}$
- $\frac{1}{s} = \frac{d}{\Delta X}$
- $\Delta X = s * d$
- $A = d(b + s.d)$



# for a three level section

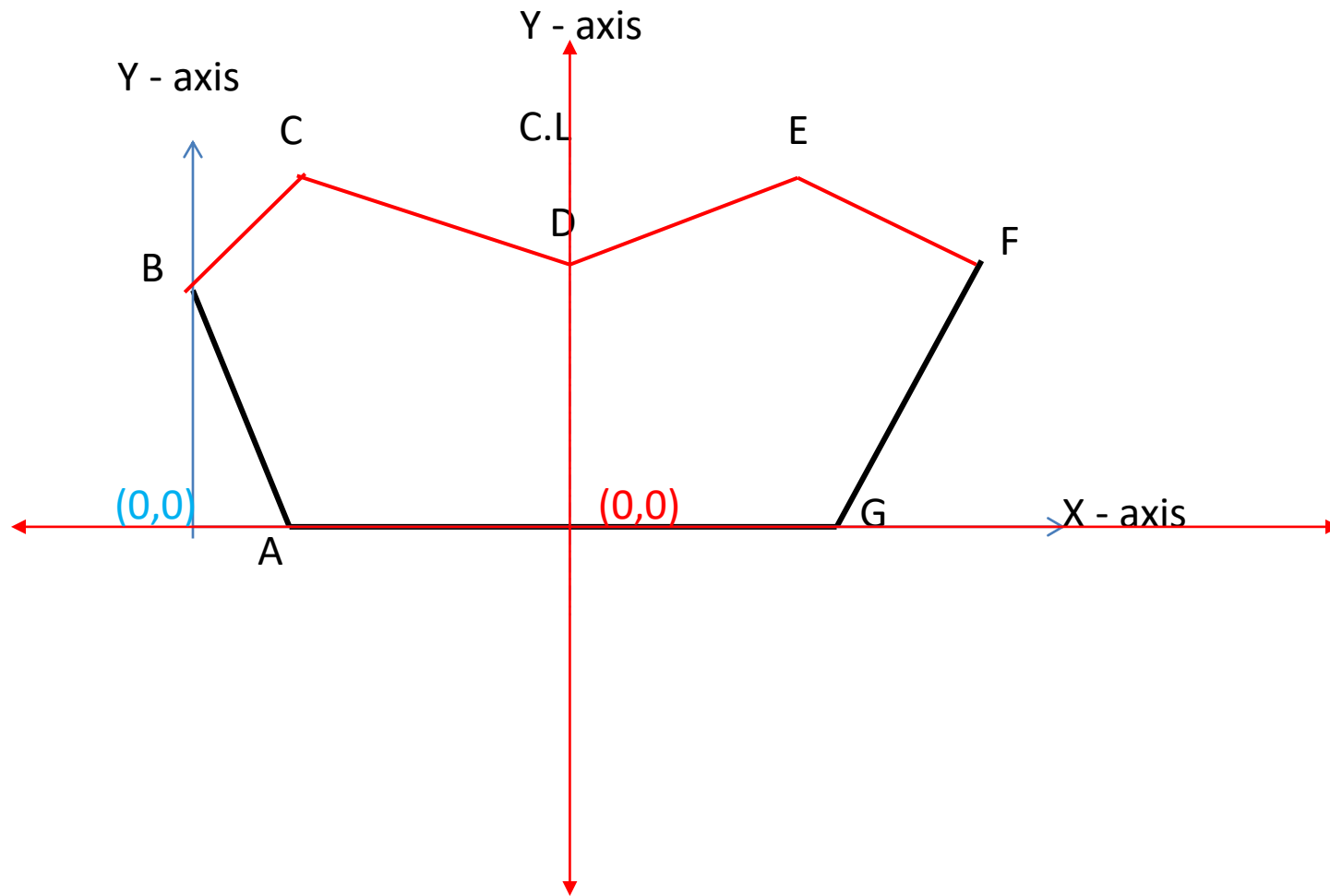
- $A = \frac{1}{2}[b/2(dR+dL)+d(xR+xL)]$





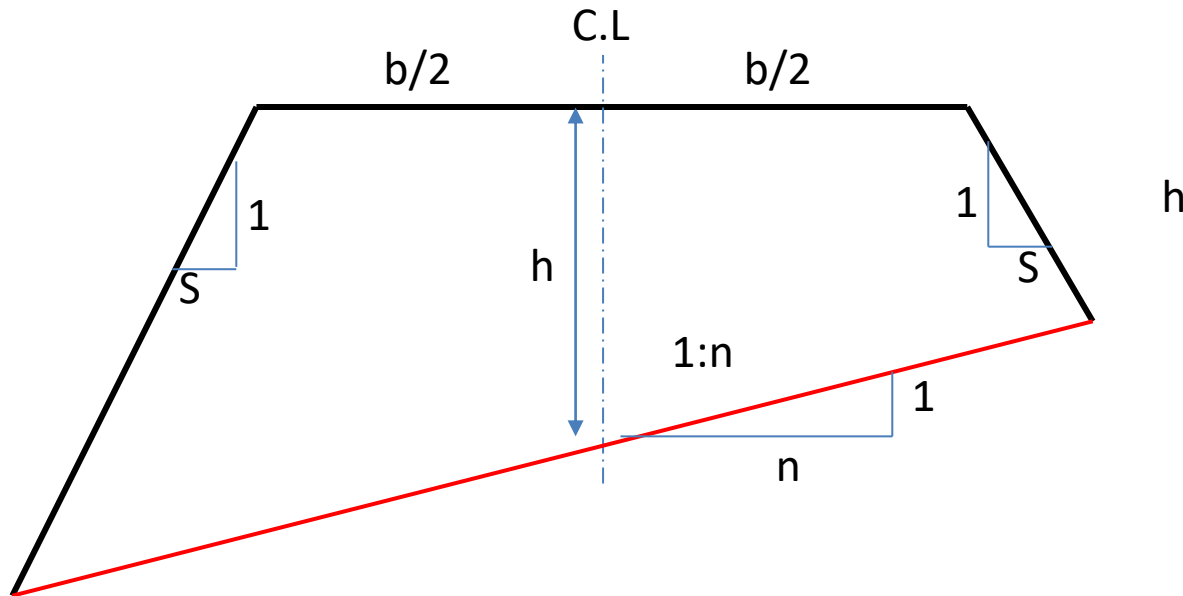
# fora Multi level section

- Compute Area by coordinate



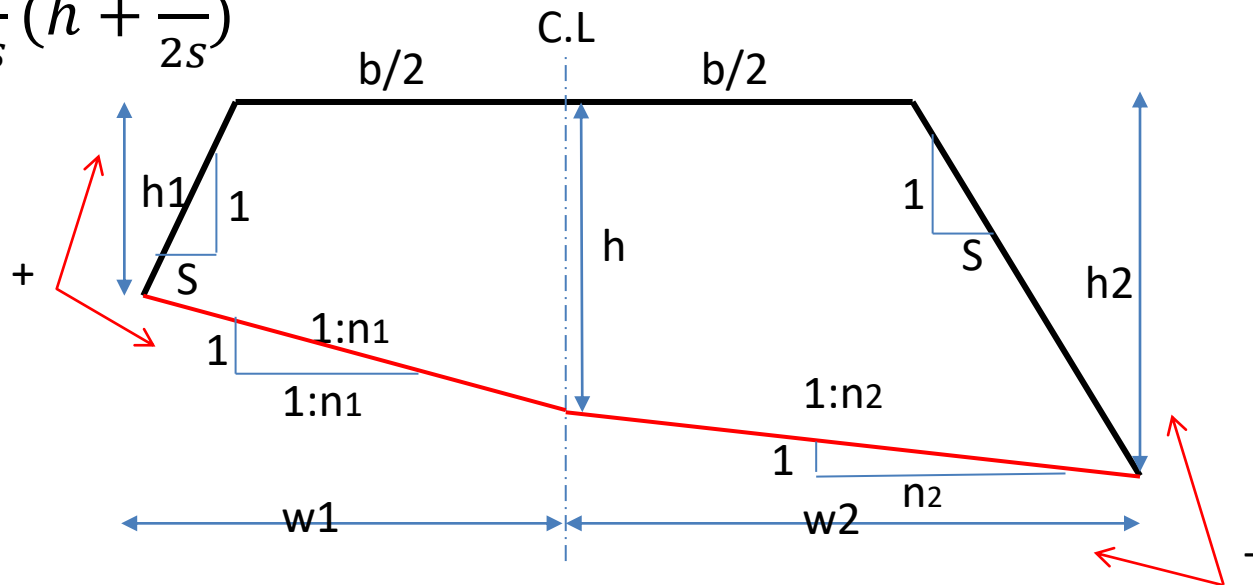
# One slope

- $$A = \left(h + \frac{b}{2s}\right)^2 \left(\frac{n^2 \cdot s}{n^2 - s^2}\right) - \frac{b^2}{4s}$$



# Two slope

- $A = \frac{W}{2} \left( h + \frac{b}{2s} \right) - \frac{b^2}{4s}$
- $W = w1 + w2$
- $W1 = \frac{n1 \cdot s}{n1 + s} \left( h + \frac{b}{2s} \right)$
- $W2 = \frac{n2 \cdot s}{n2 - s} \left( h + \frac{b}{2s} \right)$



# Two slope

- $$h1 = \frac{n1h - \frac{b}{2}}{n1 + s}$$

- $$h2 = \frac{n2h + \frac{b}{2}}{n2 - s}$$

- $$A = \frac{1}{2} \left( h + \frac{b}{2s} \right)^2 \left( \frac{n1s}{n1 + s} + \frac{n2s}{n2 - s} \right) - \frac{b^2}{4s}$$

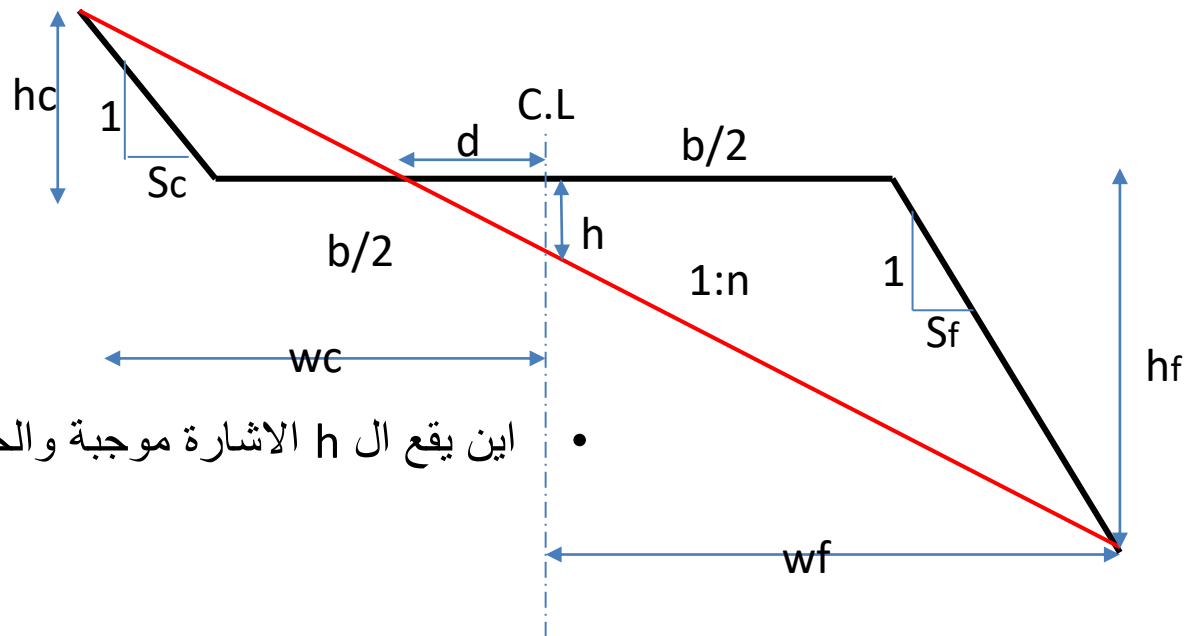
# One slope Side – Hill

- $A_c = \frac{hc}{2} \left( \frac{b}{2} - d \right)$

- $A_f = \frac{hf}{2} \left( \frac{b}{2} + d \right)$

- $hc = \frac{\frac{b}{2} - n \cdot h}{n - s_c}$

- $hf = \frac{\frac{b}{2} + n \cdot h}{n - s_f}$



• اين يقع ال  $h$  الاشارة موجبة والجزء الثاني سالب في حساب ال  $h, w$