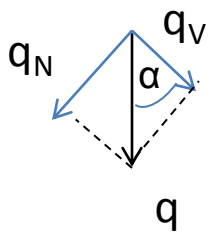
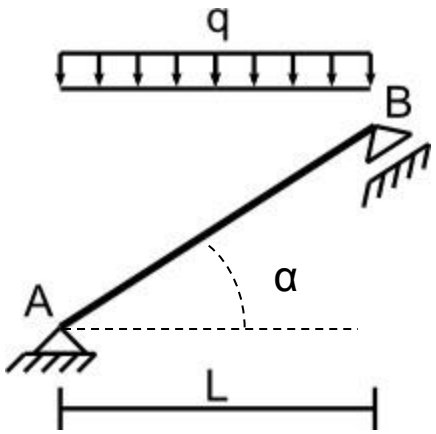
Ejemplo Pórtico

Carga o barras inclinadas



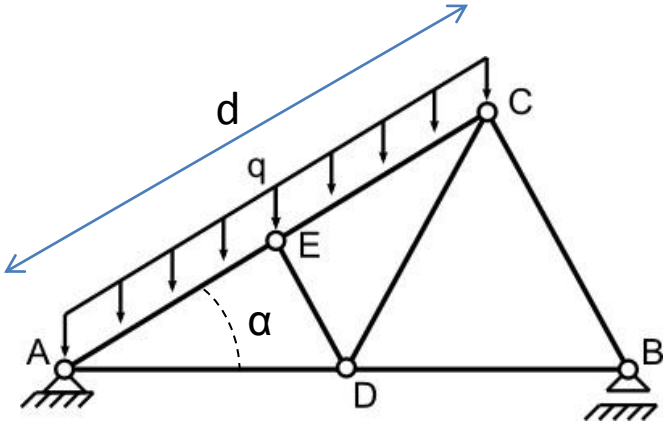


q por unidad de longitud horizontal

$q_N = q.\text{sen}\ \alpha$

$q_V = q.\cos\ \alpha$

Resultante = q . L



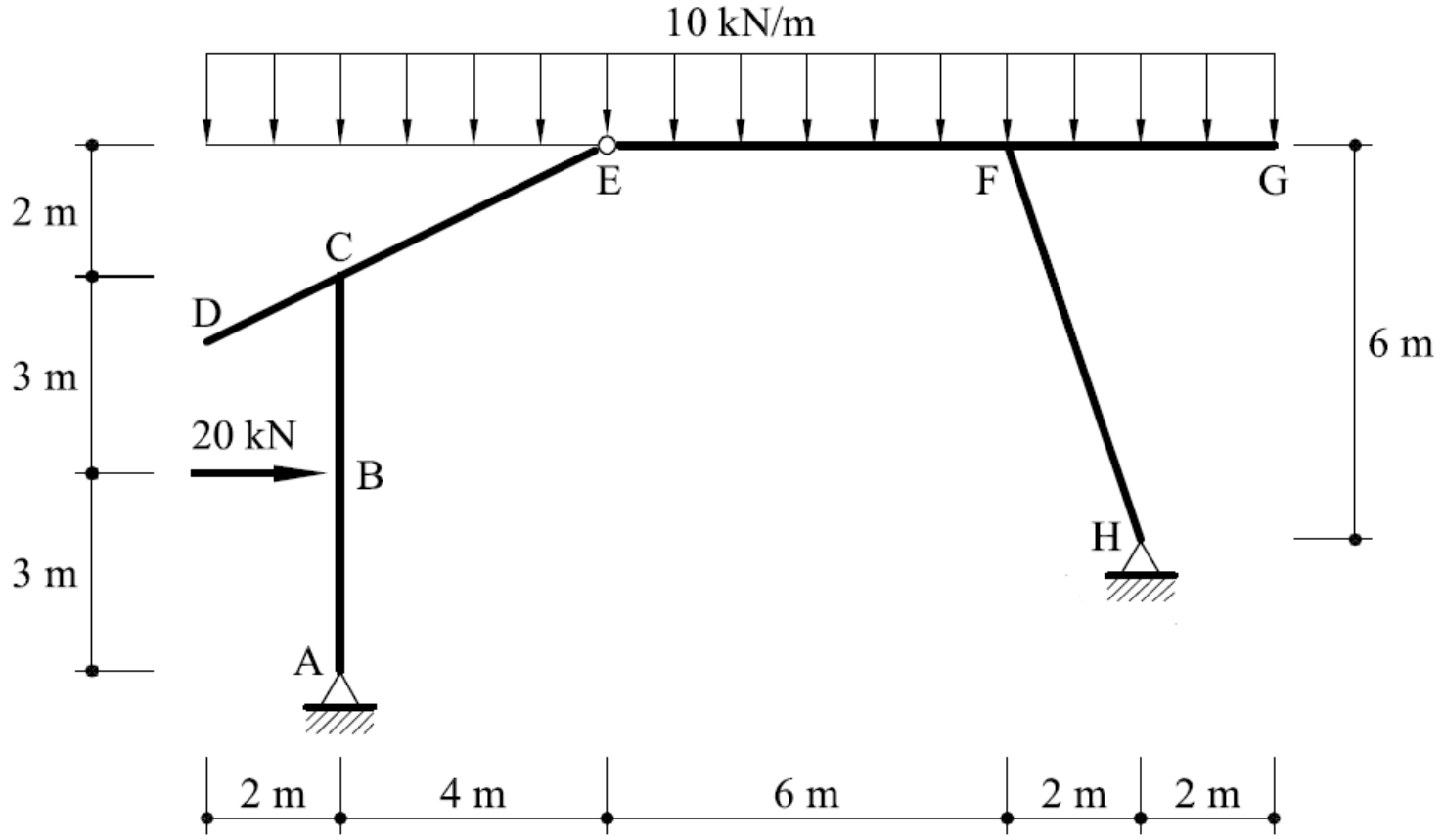
q por unidad de longitud de barra

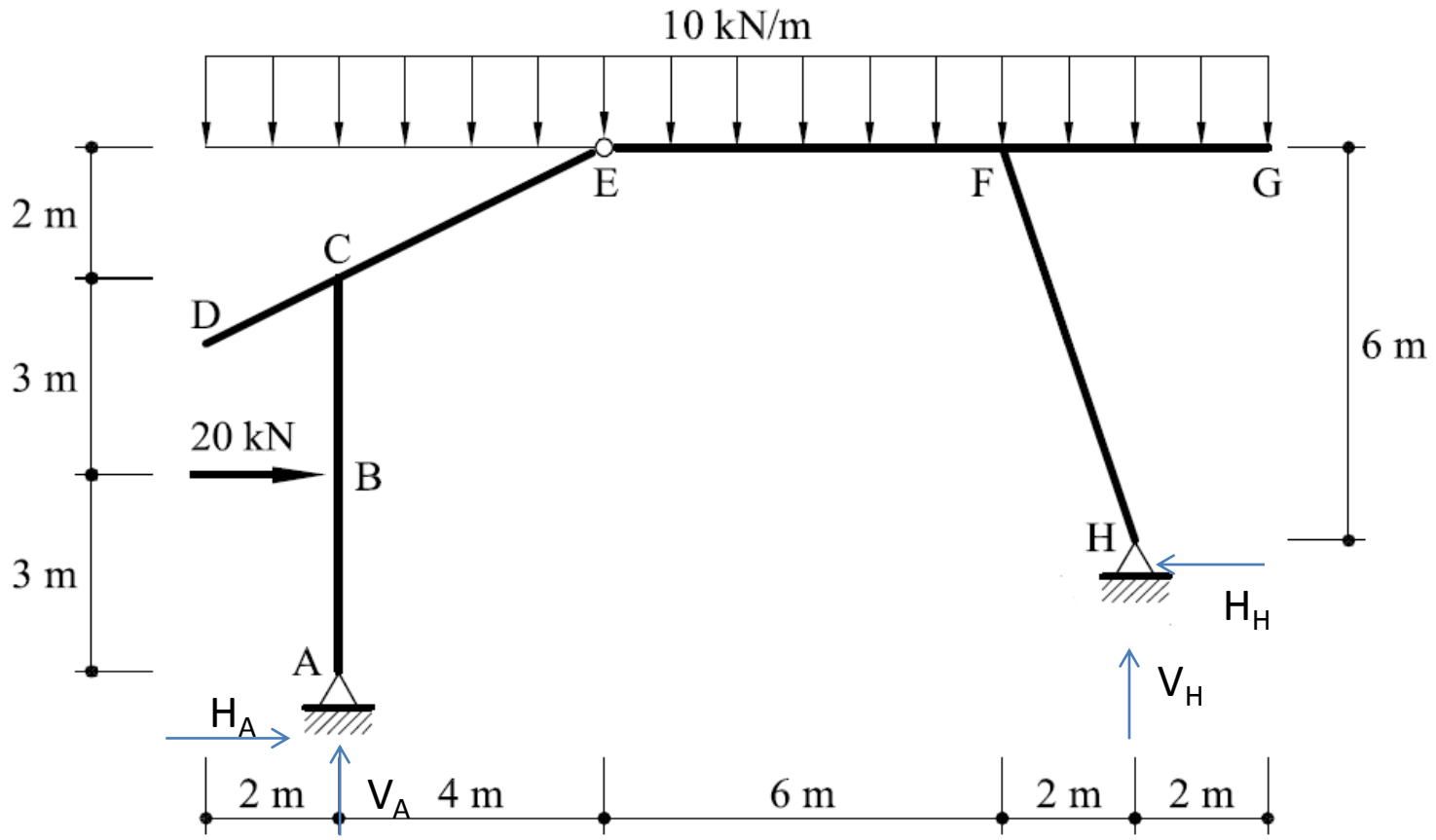
$q_N = q.\text{sen}\ \alpha$

$q_V = q.\cos\ \alpha$

Resultante= q . d

Ej. Examen Julio 2017





Sum(M_H=0)

10.16. 6-20.1+2.H_A-12.V_A=0

235+H_A/2-3.V_A=0

V_A= 79.09 kN H_A= 4.55 kN

Aislando ABDE Sum(M_{izqE} =0)

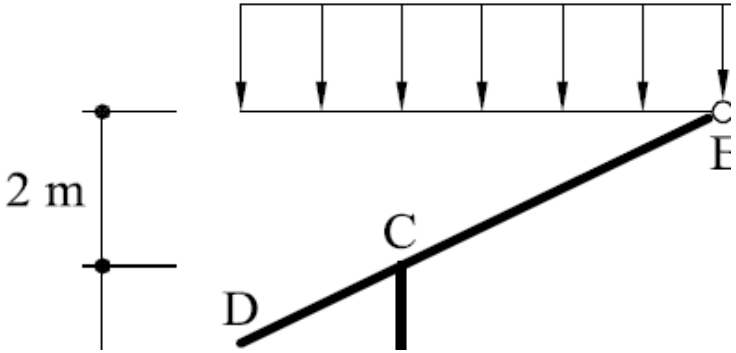
6.10.3+20.5+8.H_A-4.V_A =0

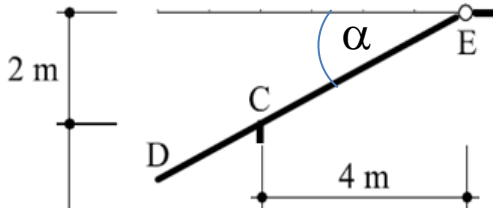
70+2.H_A-V_A=0

Sum(F_V=0)→ V_H= 80.91 kN

Sum(F_H=0) → H_H = 24.55 kN

Carga distribuida en la barra





α =Arctg(0.5)
sin (α) =0.447
cos(α)=0.894

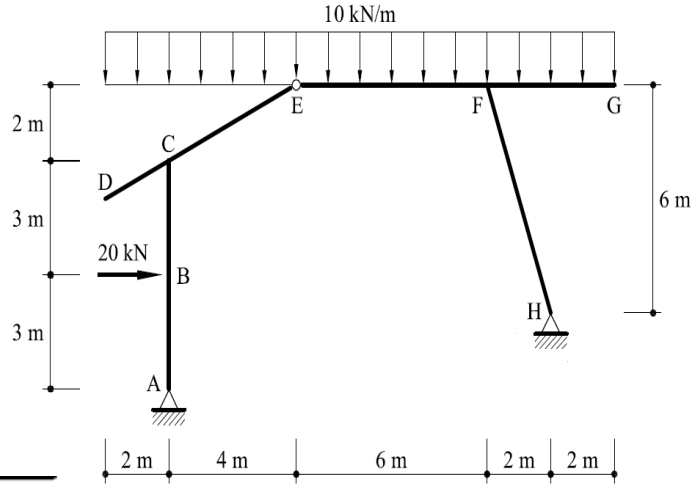
Para calcular la directa

q_N= 10* 0.447=4.47 kN/m
En C_{izq} la directa en la barra es
2*4.47= 8.94 kN

Para calcular el cortante

q_V= 10* 0.894=8.94 kN/m
En C_{izq} el cortante en la barra es
2* 8.94 = 17.9 kN

Directa



N(kN)

8.9 =20 . 0.447

+8.9

-24.5

-30.5

-30.5=-24.55. 0.894-19. 0.447

-84.5=80.9. 0.949+24.55 .0.316

-84.5

-79.09

-48.4

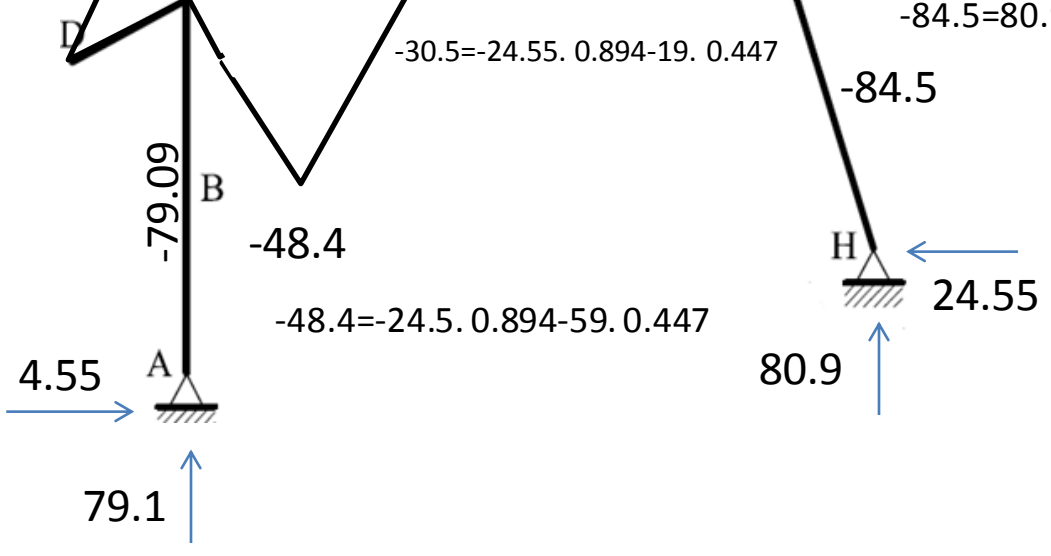
-48.4=-24.5. 0.894-59. 0.447

24.55

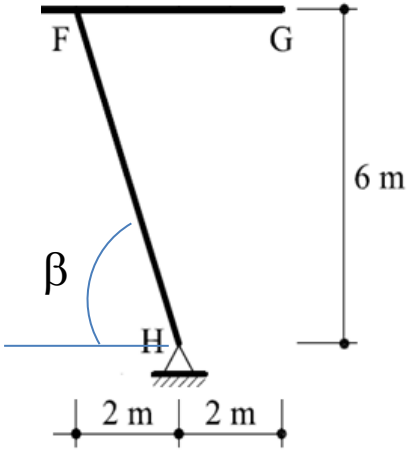
4.55

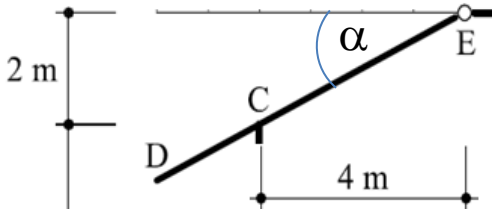
80.9

79.1



β=Arctg(3)
sin (β) =0.316
cos(β)=0.949

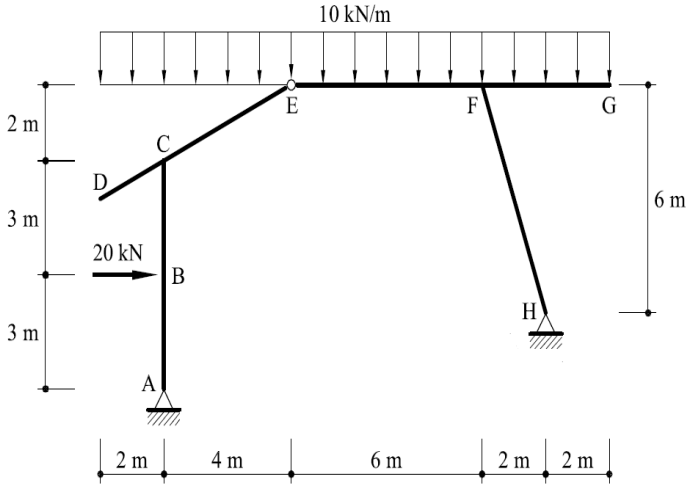




α =Arctg(0.5)
sin (α) =0.447
cos(α)=0.894

Cortante

V(kN)



6.1= (79.1-60). 0.894-24.5. 0.447

41.9= (79.1 -20). 0.894-24.55 .0.447

41.9

6.1

19.1

19.1= 79.1 -60

40

40= 79.1+80.9-12. 10

4.09

E

G

C

D

-17.9

-17.9= 20. 0.894

-40.9

-40.9= 79.1 -120

-2.3

-2.3= 24.55. 0.949-80.9. 0.316

-24.55

-4.55

A

H

24.55

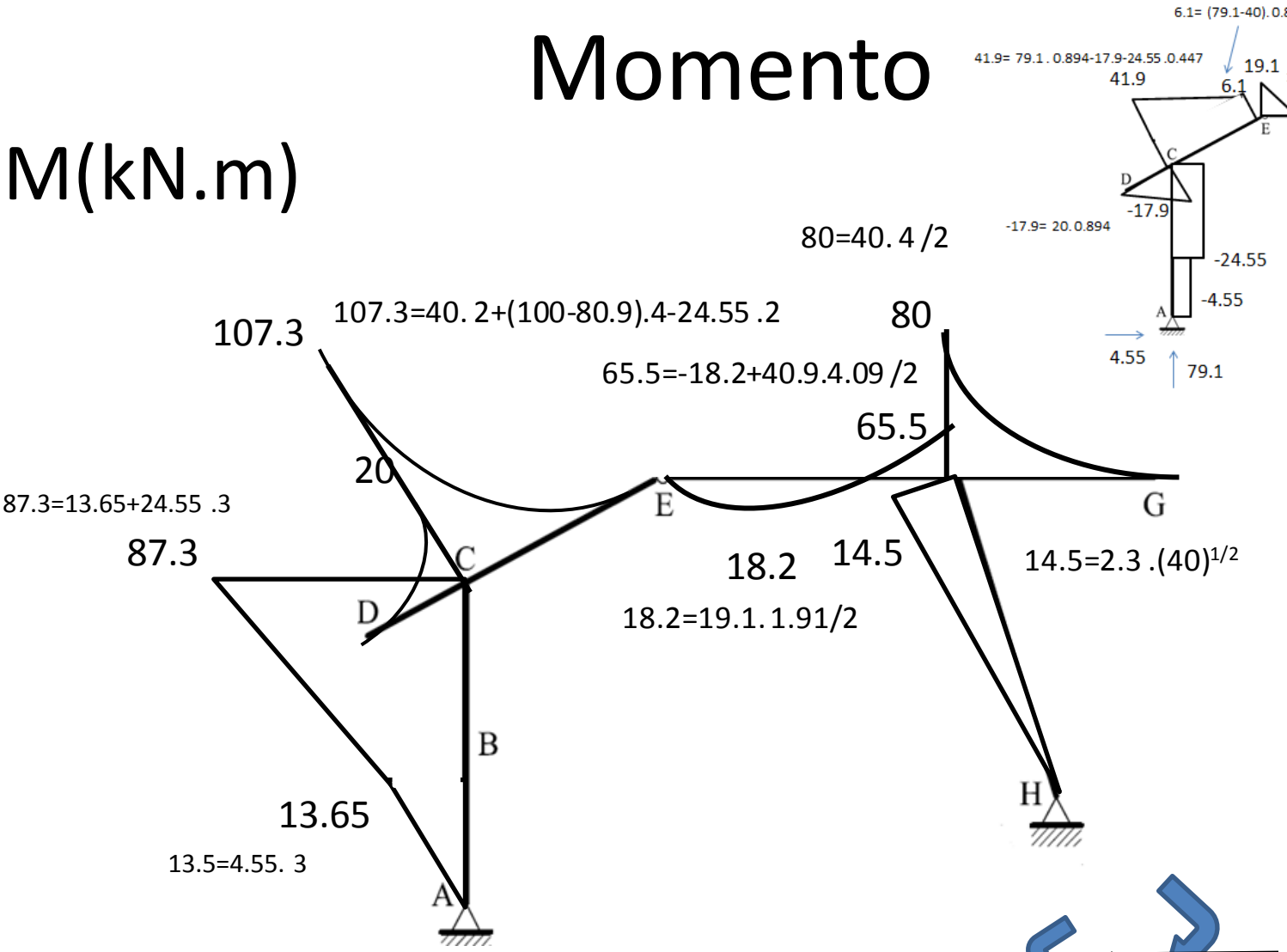
80.9

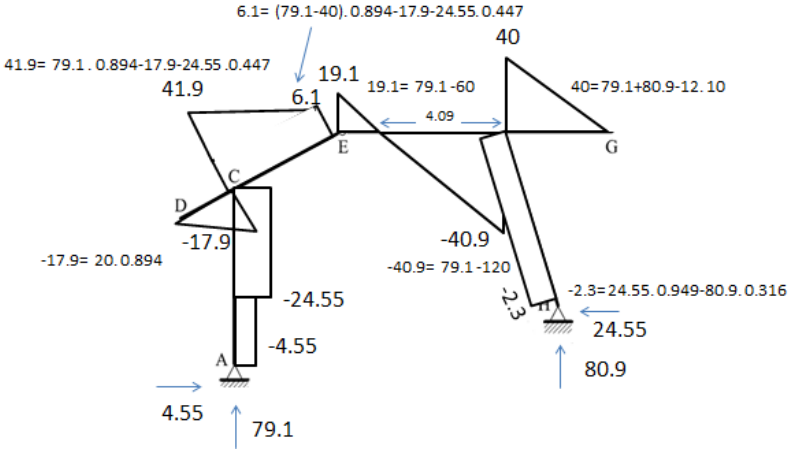
4.55

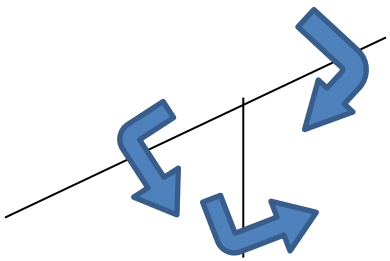
79.1

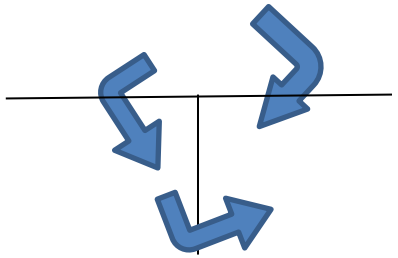
Momento

M(kN.m)





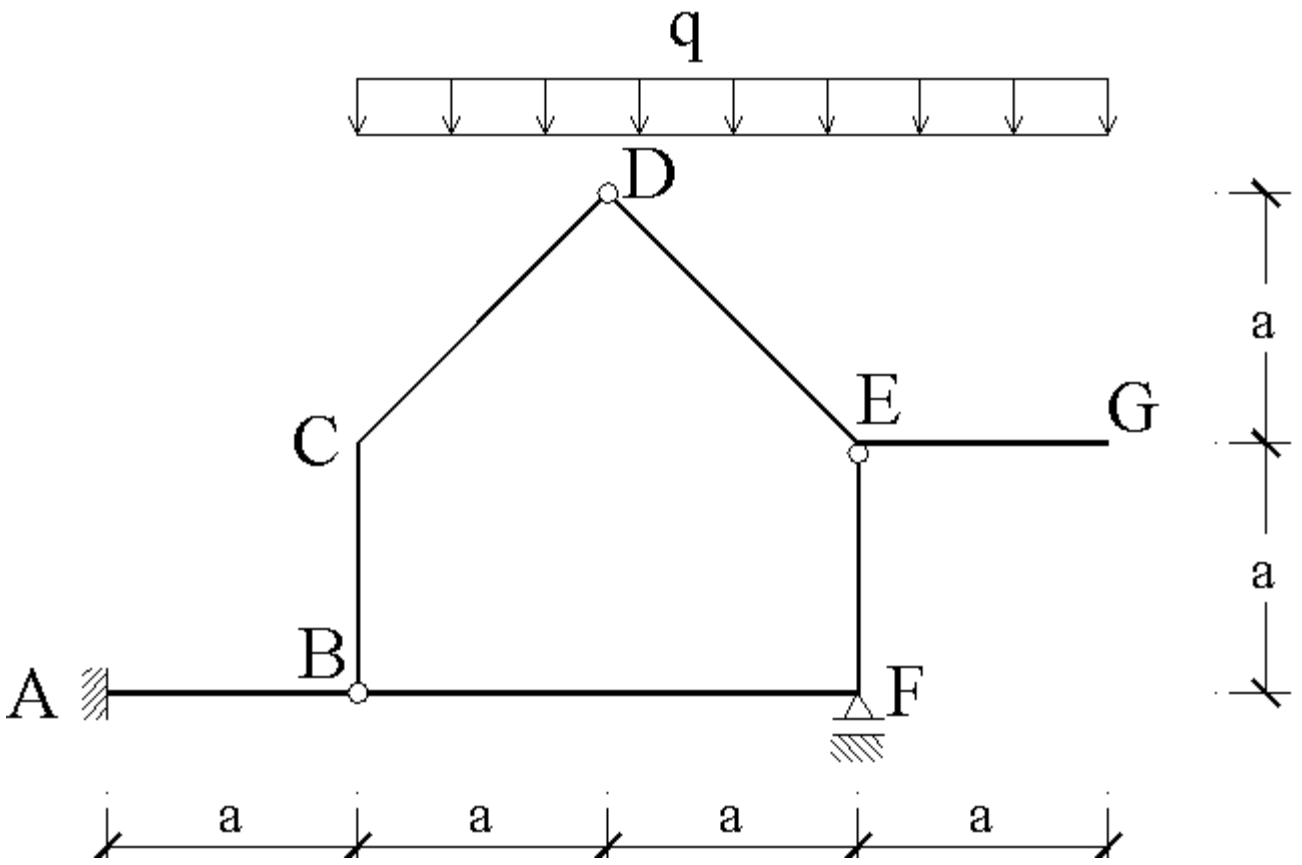




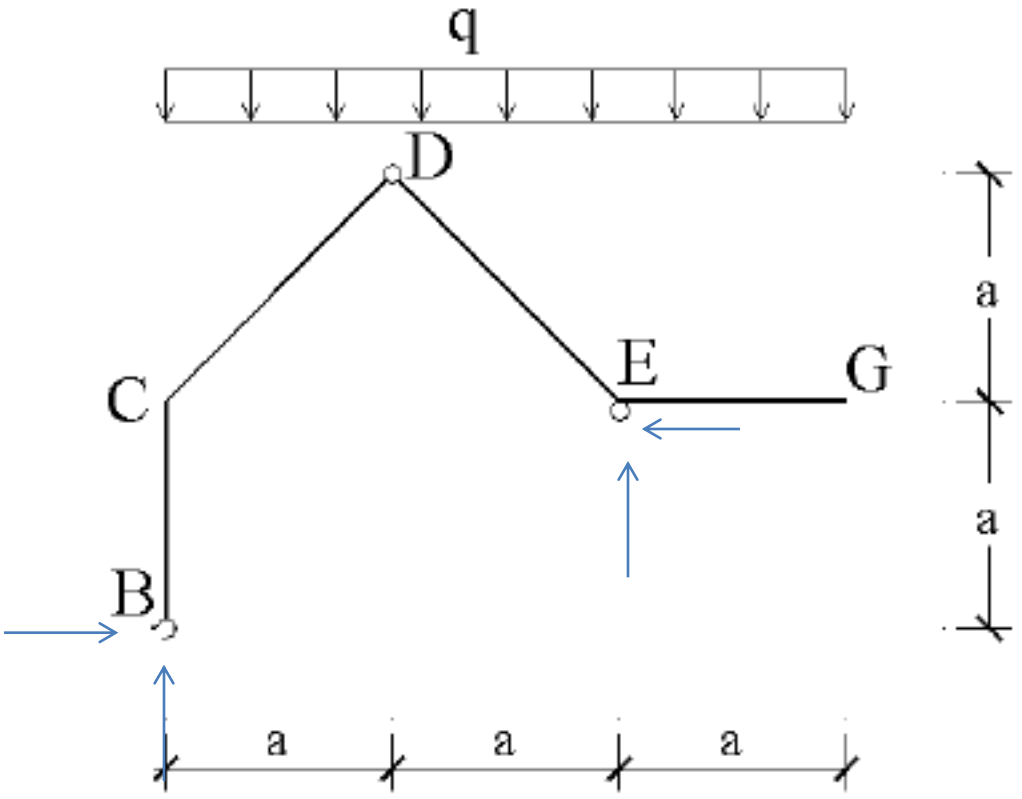
Dimensionado

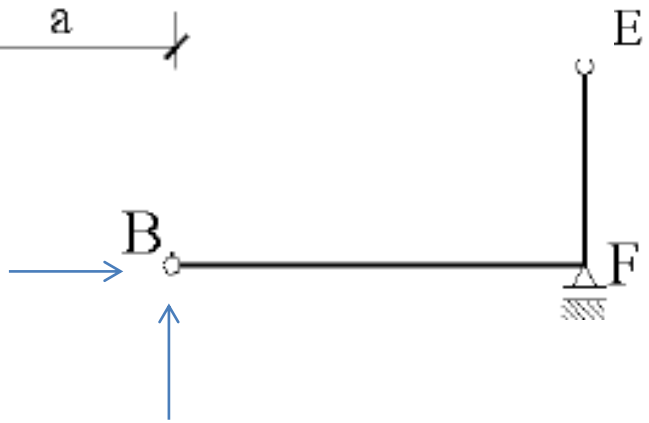
$$\sigma = \frac{N}{A} + \frac{M.y}{I}$$

Ejemplo



Estructuras tipo





Sub-estructura BCDEG

$H_B=H_E$

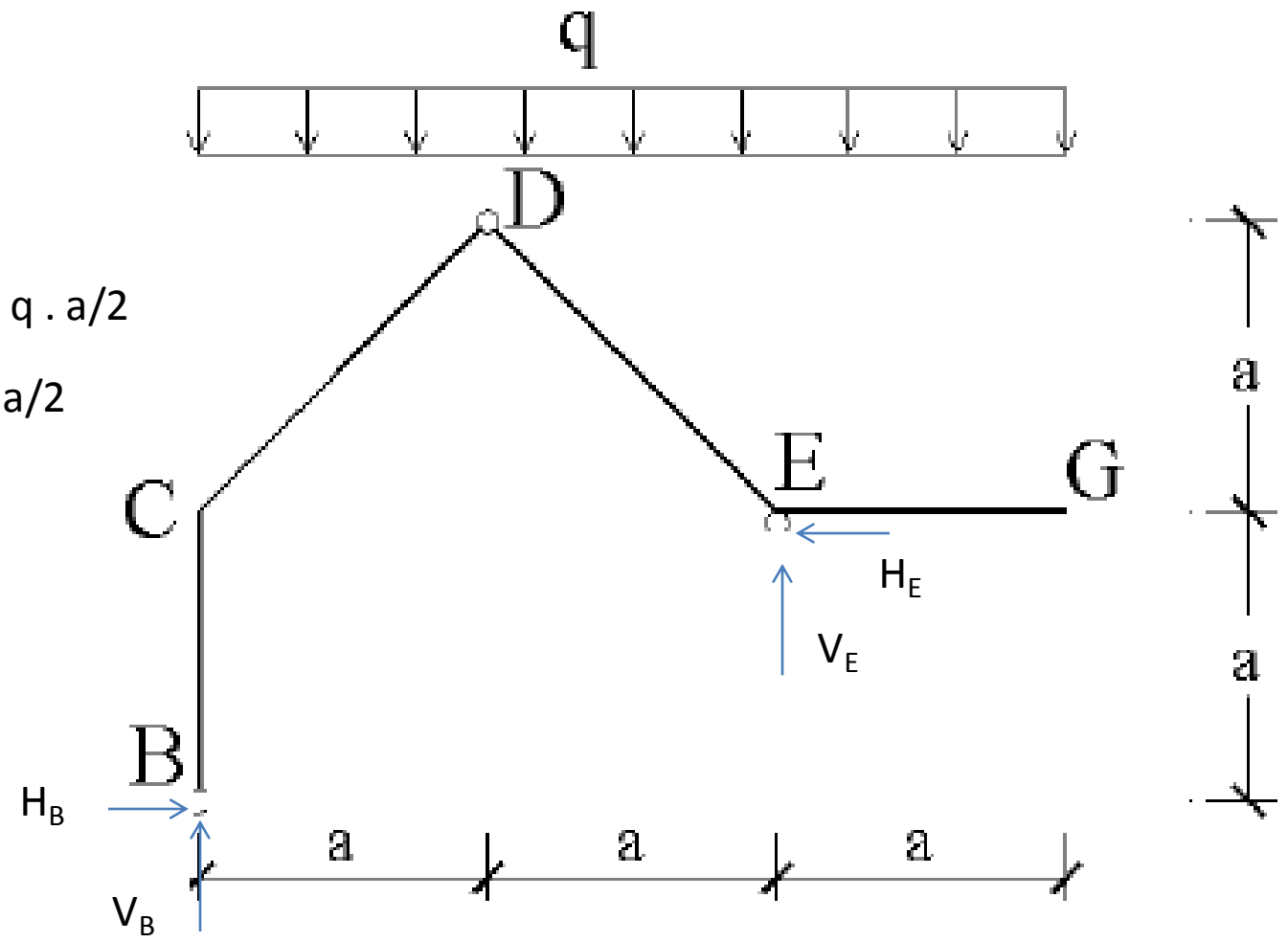
VB+VE= 3aq

$2aV_B-a\,H_b=3.a.\ q\ .\ a/2$

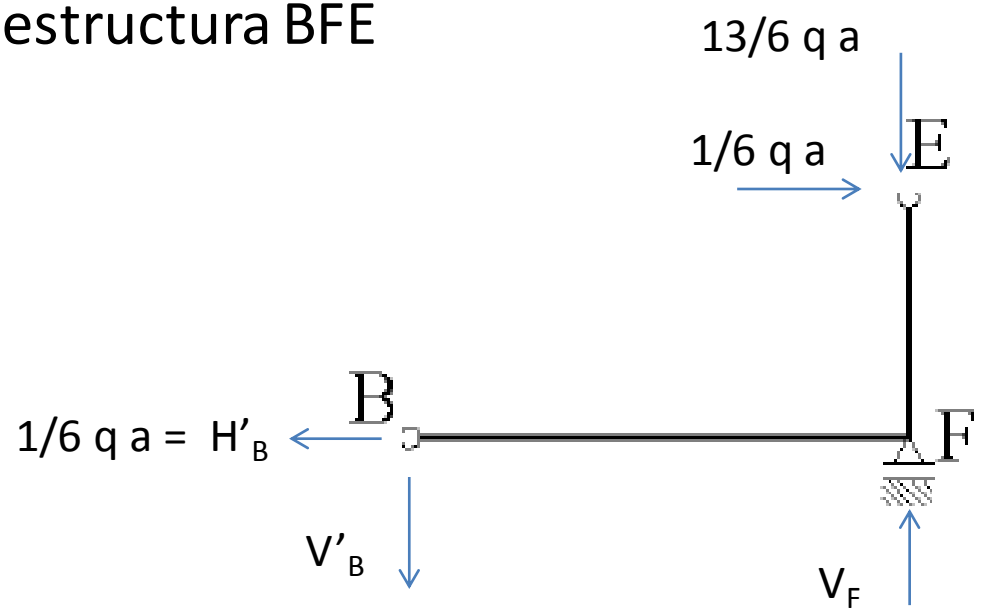
$a.V_B-2aH_B=q.a.a/2$

$H_B=1/6\ q\ a$
$H_E=1/6\ q\ a$

VB= 5/6 q a
VE= 13/6 q a



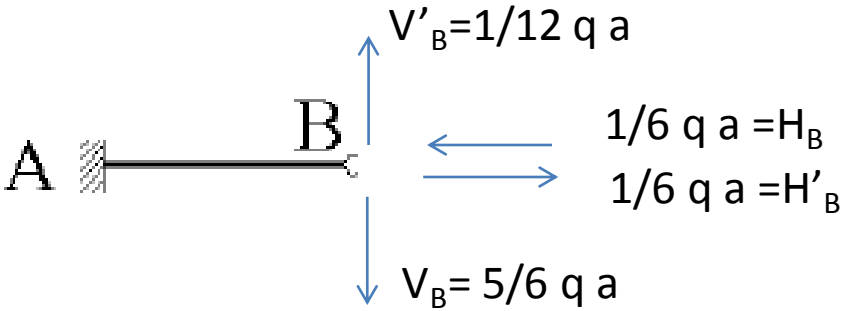
Sub-estructura BFE



$M_B=0 \quad 2\,a\,V_F - 13/6\,q\,a\,.2\,a - a.\,1/6\,q\,a=0$

$V_F=(1/6+26/12)q\,a = 9/4\,q\,a \rightarrow V'_B=1/12\,q\,a$

Sub-estructura AB



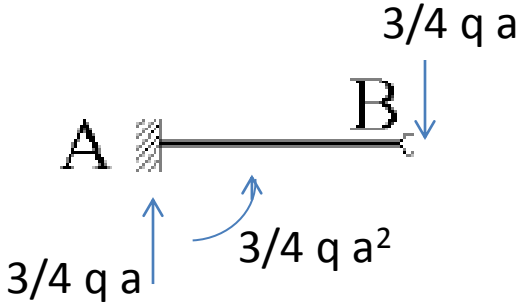
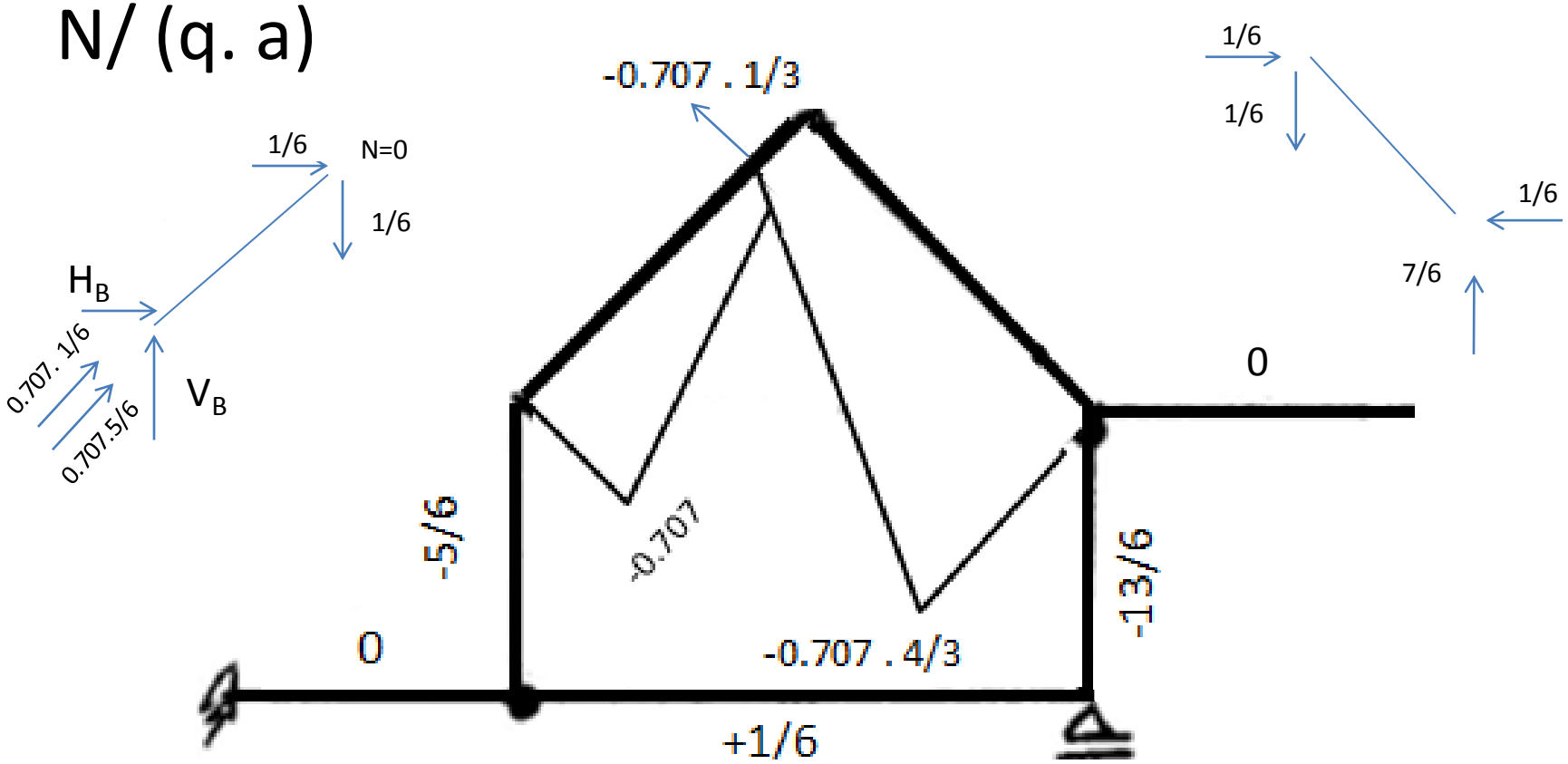
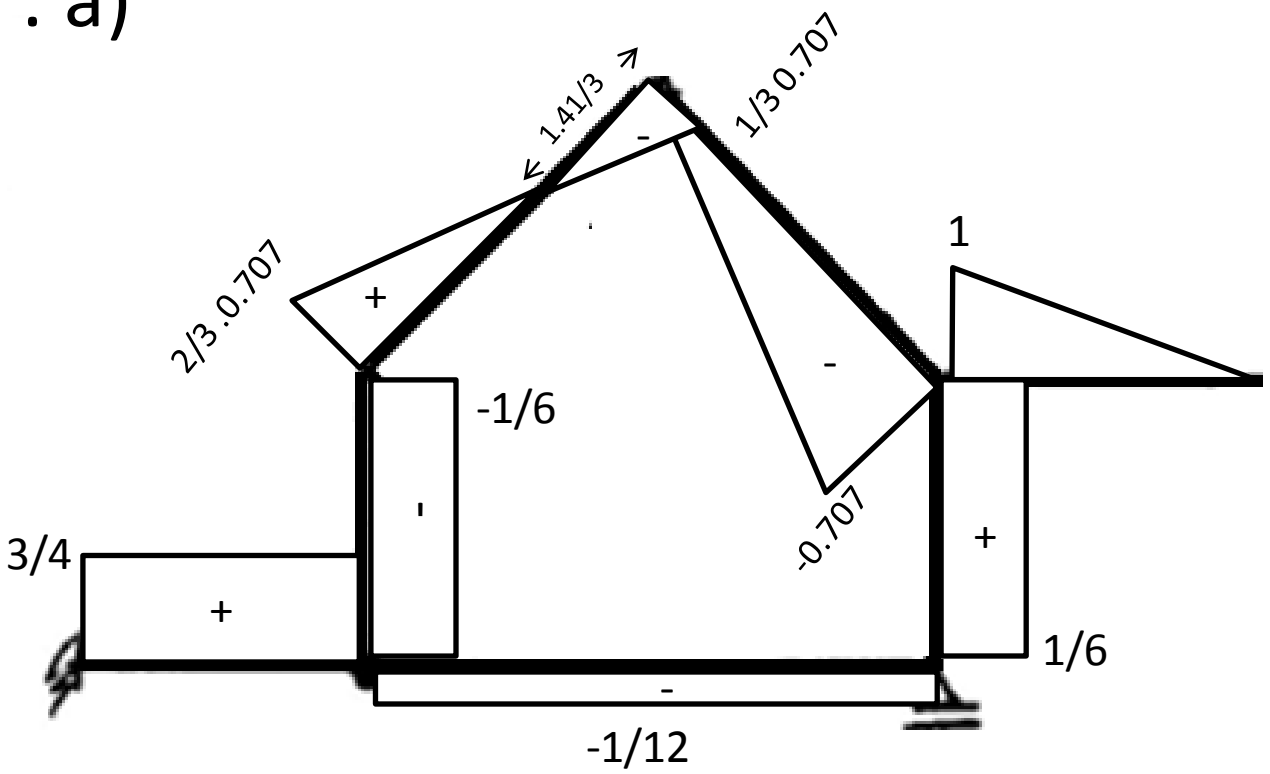


Diagrama N


N/ (q. a)
1/6
N=0
1/6
H_B
V_B
0.707 . 1/6
0.707.5/6
-0.707 . 1/3
1/6
1/6
1/6
7/6
0
-5/6
-0.707
-13/6
0
-0.707 . 4/3
+1/6

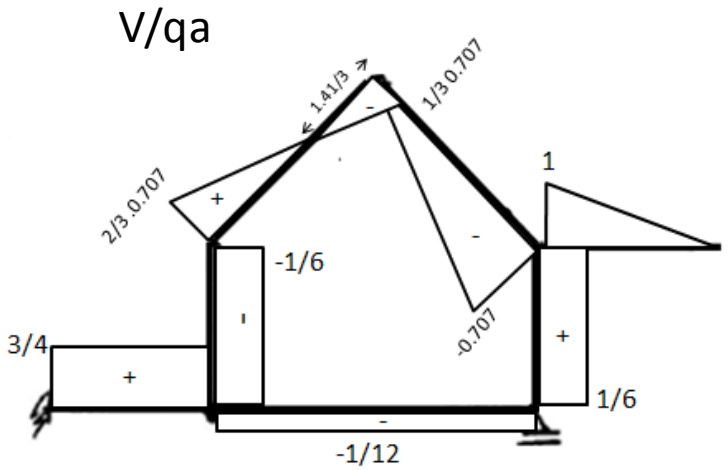
Cortante

V/ (q . a)



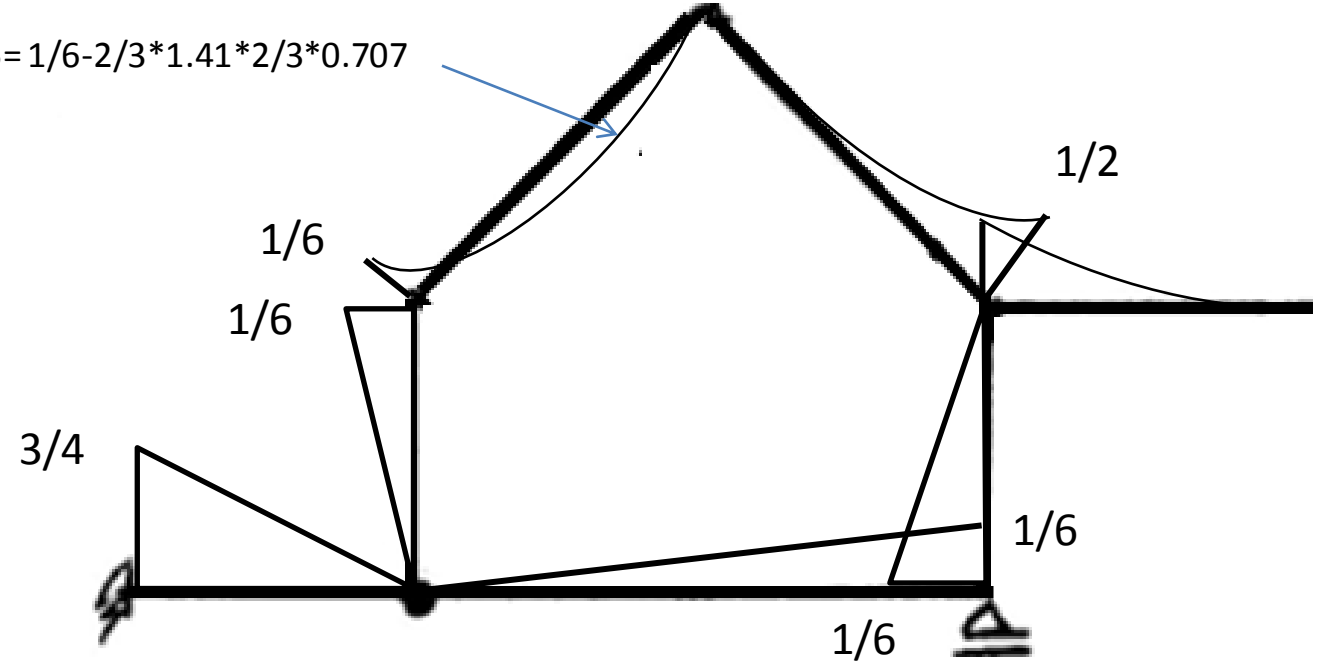
Momento

V/qa



M/ (q . a)

-0.05= 1/6-2/3*1.41*2/3*0.707



Cargas indirectas