Repaso

Resumen: Directa

$$\varepsilon = \lim_{\Delta x \to 0} \frac{\Delta u}{\Delta x} = \frac{du}{dx}$$

Tensión normal por directa: $\sigma = \frac{N}{A}$

Ley de Hooke: $\sigma = E.\varepsilon$

Relación entre **q, N y u:**

en un tramo **con A y E cte:** $-q = \frac{dN}{dx} = AE\frac{d^2u}{dx^2}$

Reticulados: Equilibrio de nudos, procedimiento

- Identificar simetrías
- Identificar las barras que no llevan esfuerzos
- Comenzar por los nudos canónicos (equilibrio)
- Plantear las ecuaciones de equilibrio de cada nudo

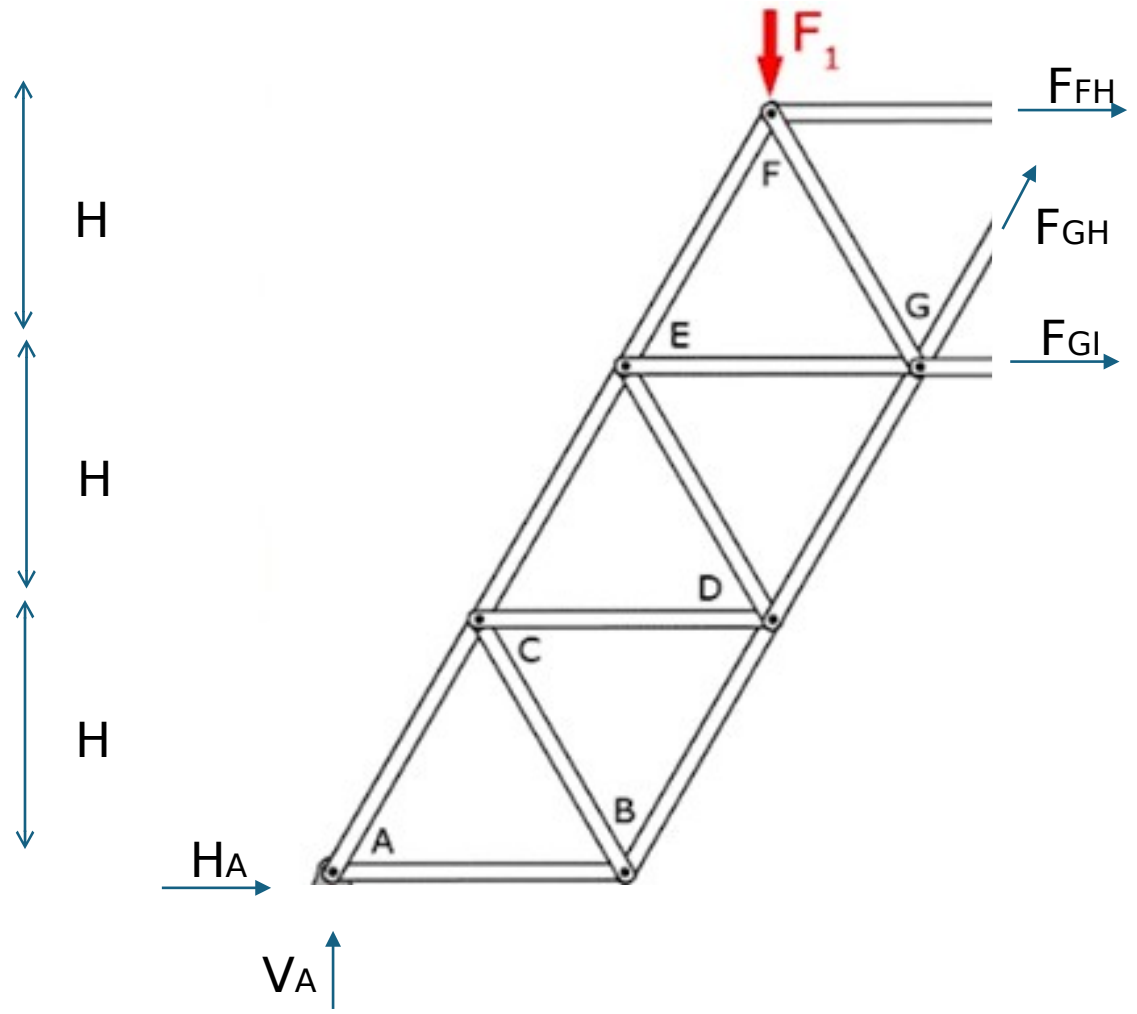
Conocidas todas las fuerzas en un reticulado y dada la tensión admisible vamos al dimensionado.

El dimensionado consiste en calcular el área mínima de la sección de las barras tal que para todas las barras se cumpla:

$$\sigma_{adm} \geq F/Area$$

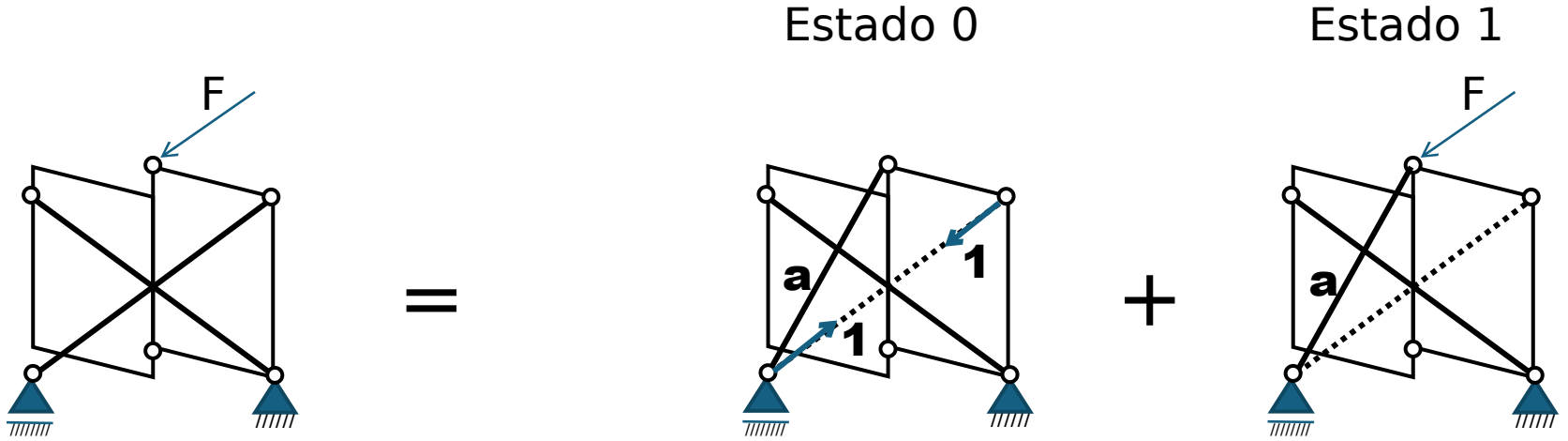
$$Area \geq F/\sigma_{adm}$$

Metodo de las secciones o Ritter:



Suma(M_H)=0

Método *de Henneberg*



Aplicando el ppio. de sup., para cada barra ***n***:
$F_n = X * F_{n,0} + F_{n,1}$

$$X = -\frac{F_{a,1}}{F_{a,0}}$$

Secciones

$$x_G = \mu_y / A = \int_A x dA \Big/ \int_A dA$$

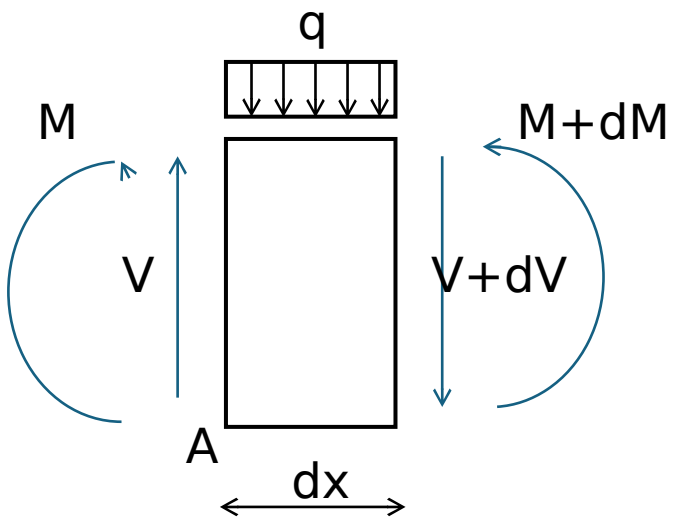
$$y_G = \mu_x / A = \int_A y dA \Big/ \int_A dA$$

$$I_x = I_{x_G} + A.d_y^2$$

$$I_{xy} = \int_A xy dA$$

Teoria de Vigas

$$-q = \frac{dV}{dx} = \frac{d^2M}{dx^2}$$



$$\sigma = -\frac{M.y}{I}$$

$$\sigma_{max} = \frac{M}{W}$$

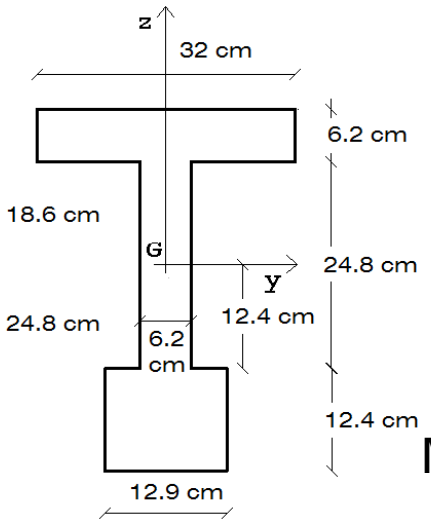
$W \geq Mmax/\ \sigma adm$

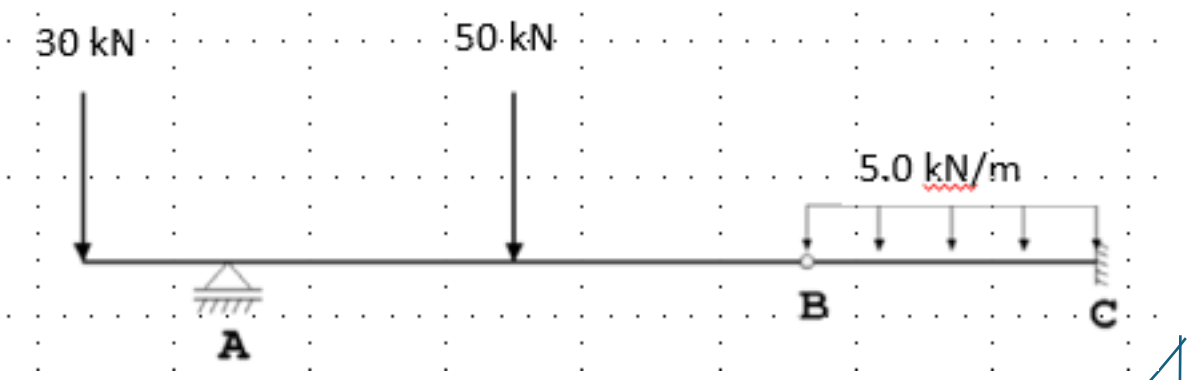
En caso de no haber simetría:

$$W^S = \frac{I}{|y^S|} \quad W^i = \frac{I}{|y^i|}$$

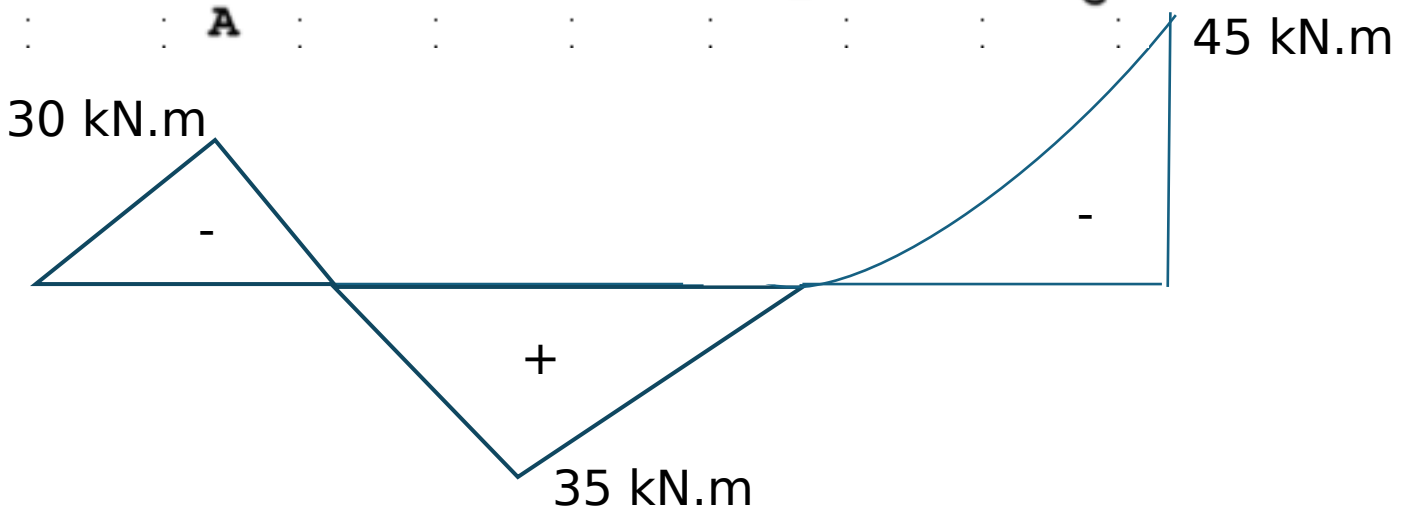
σ tracc

σ_{comp}





M (kN.m)



$\sigma_{adm\ tracción} = 7{,}5$ MPa

$\sigma_{adm\ compresión} = 10$ MPa

$W_{sup} = 6029.7 cm^3$

$W_{inf} = 4522.3\ cm^3$

$M^+ = 35$ kN.m

$\sigma_{tracción} = 35/Winf$

$\sigma_{compresión} = 35/Wsup$

$M^- = 45$ kN.m

$\sigma_{compresión} = 45/W_{inf}$

$\sigma_{tracción} = 45/W_{sup}$

Tensiones

M^{+}=35 kN.m

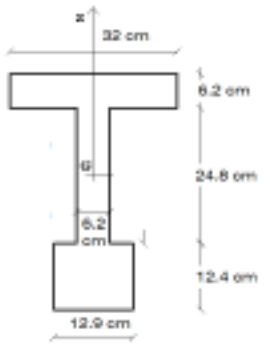
$\sigma_{tracción}$= 35/W_{inf}=7.7 MPa

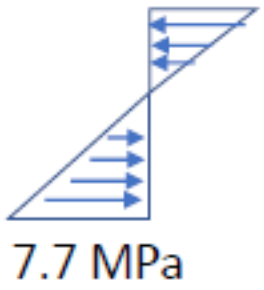
$\sigma_{compresión}$= 35/W_{sup} =5.6 MPa

M^{-}= 45 kN.m

$\sigma_{compresión}$ = 45/W_{inf} = 9.9 MPa

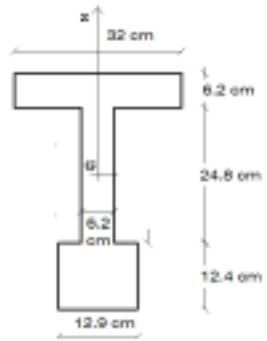
$\sigma_{tracción}$ = 45/W_{sup} = 7.3 MPa

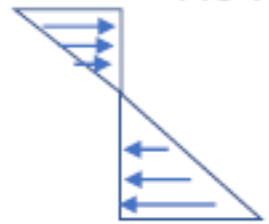




-5.6 MPa

7.7 MPa





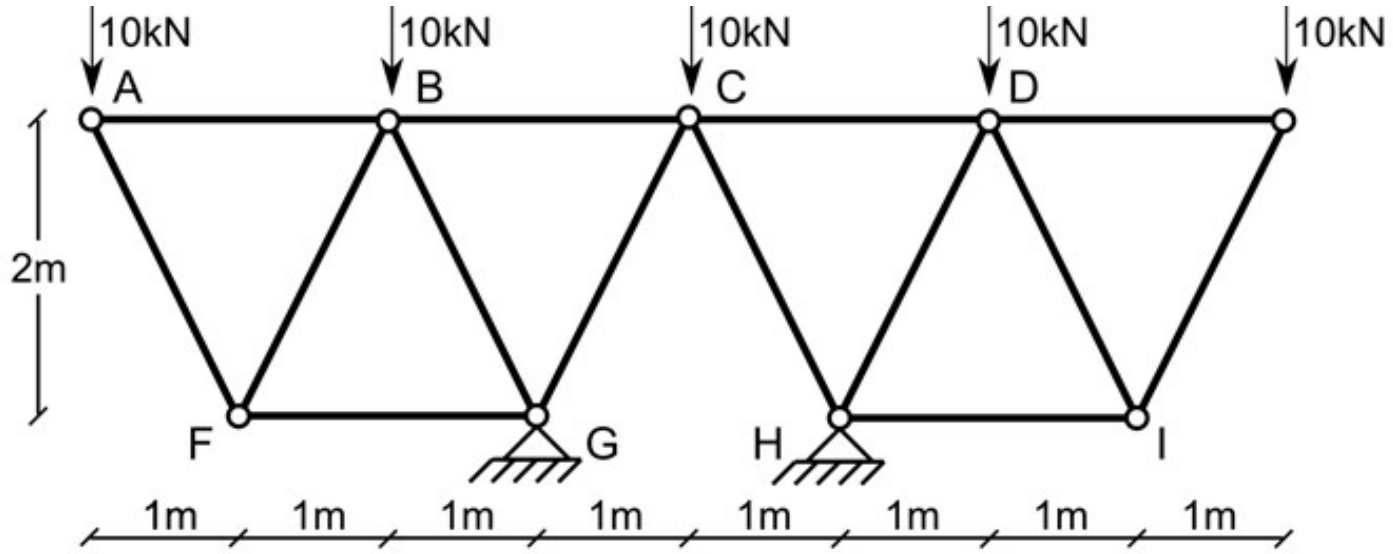
7.3 MPa

-9.9 MPa

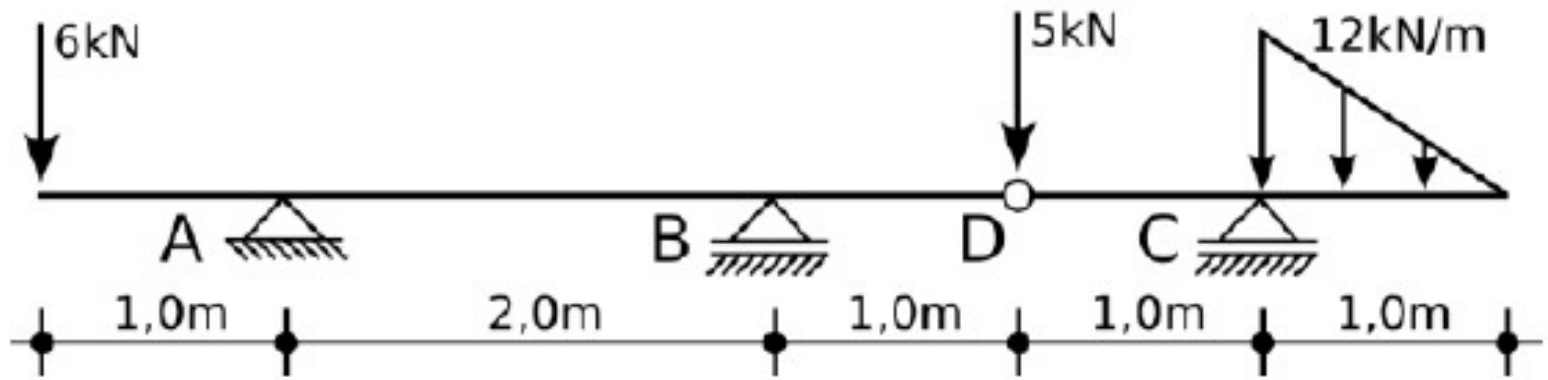
σadm tracción = 7.5 MPa

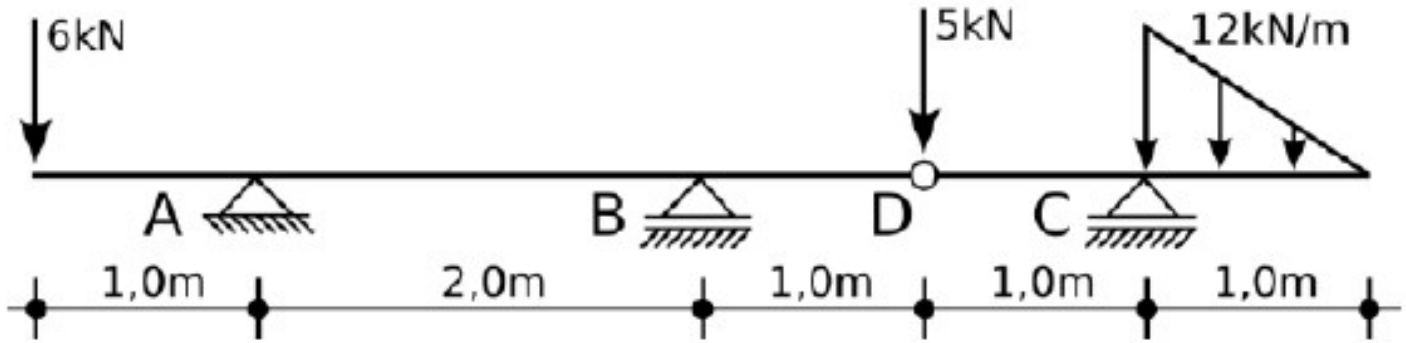
σadm compresión = 10 MPa

Arco de 3 articulaciones

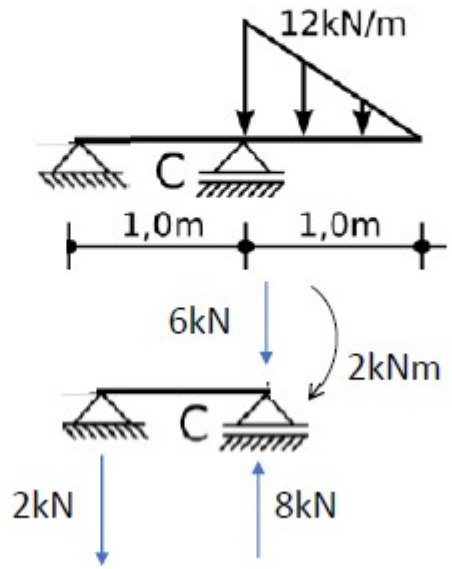


Ejemplo

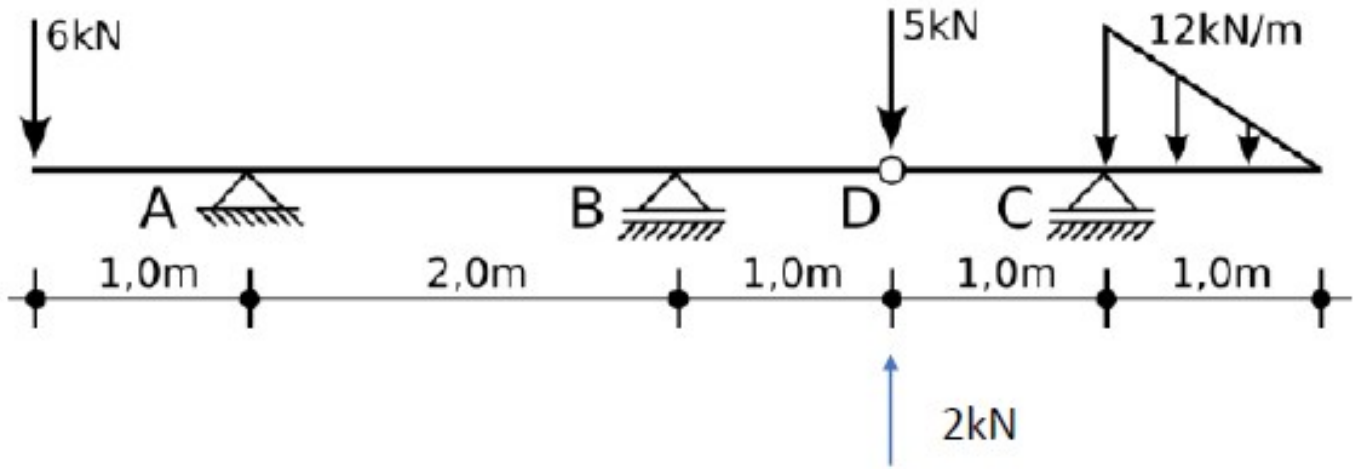


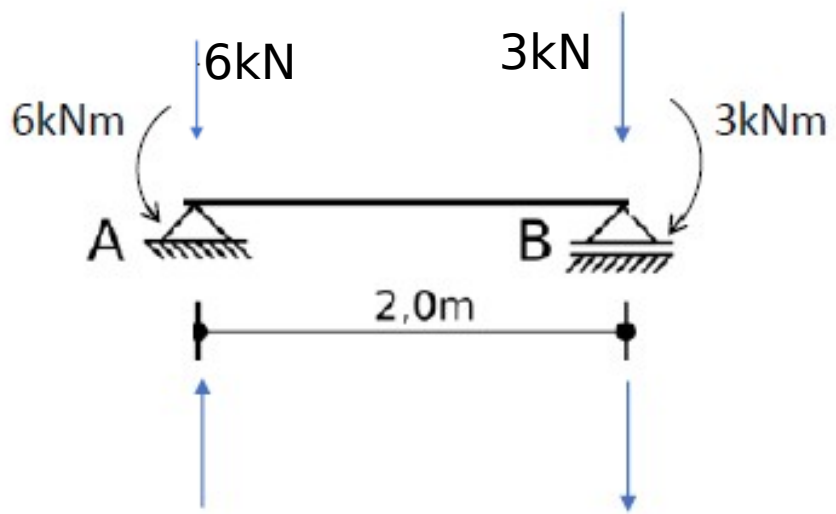


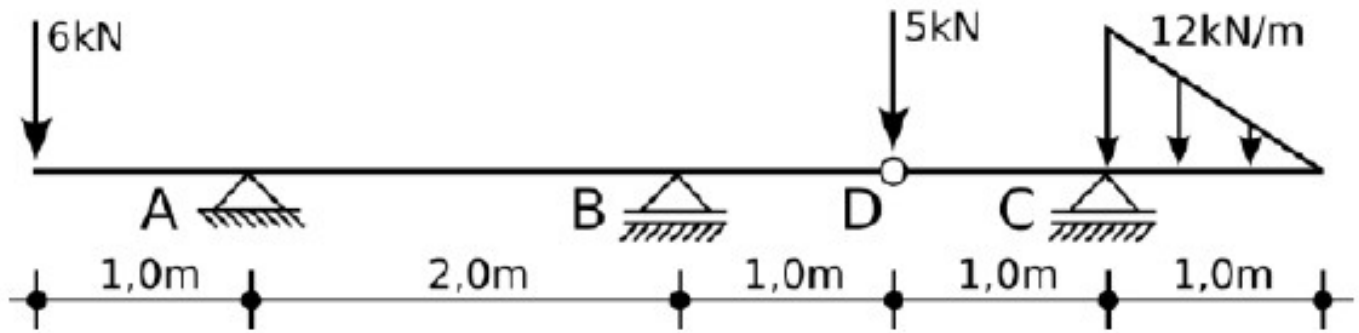
Lado derecho se apoya en el izq.



Lado izquierdo






6kN
5kN
12kN/m
A
B
D
C
1,0m
2,0m
1,0m
1,0m
1,0m

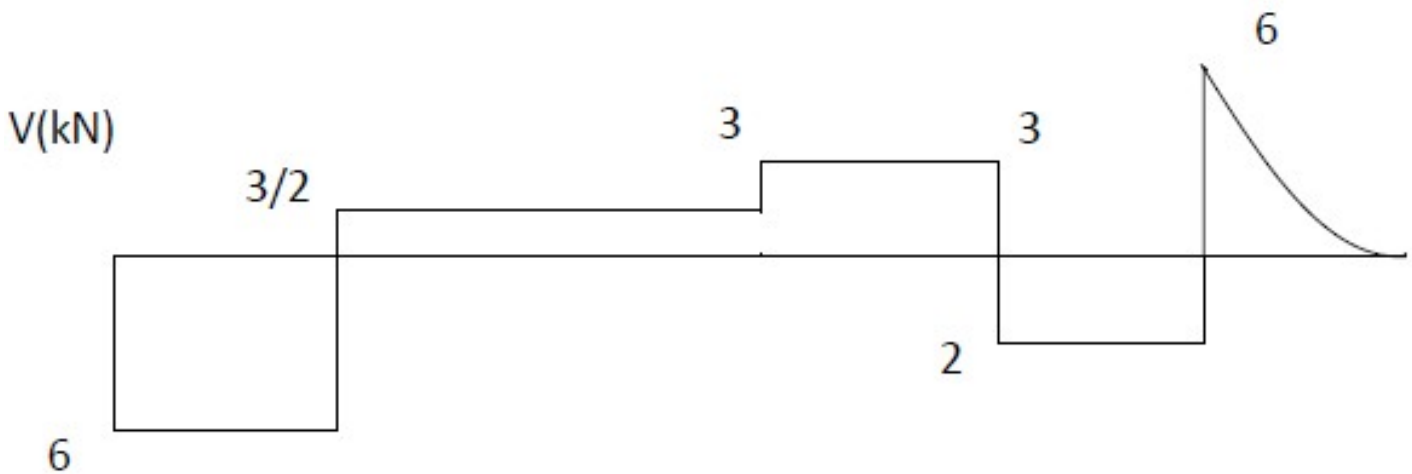
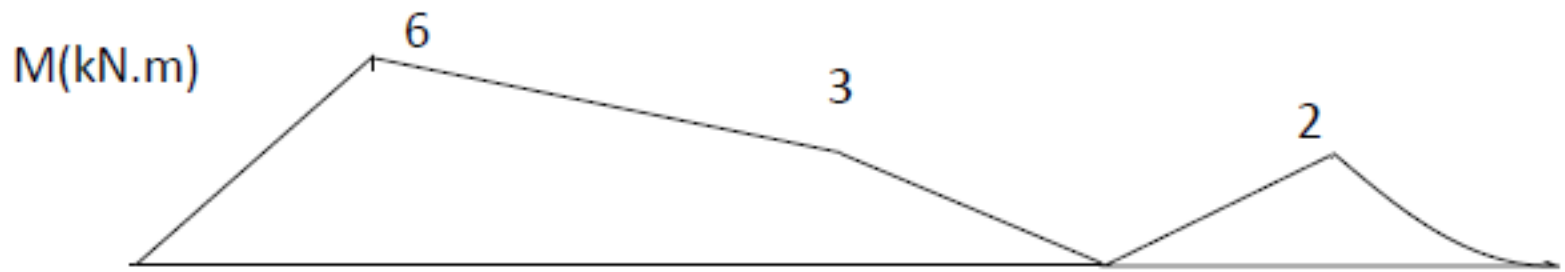
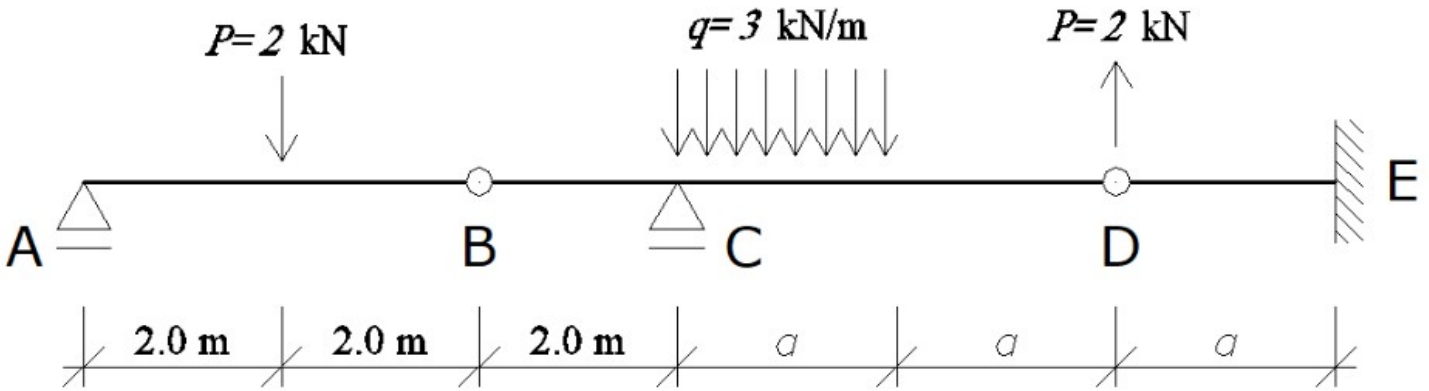
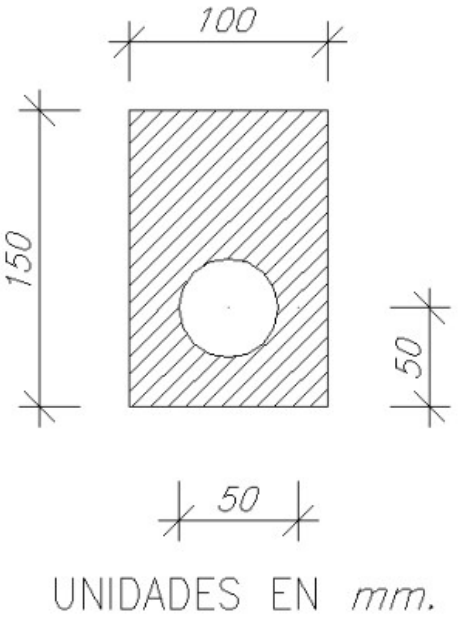

V(kN)
6
3/2
3
3
2
6

Diagrama de Momento

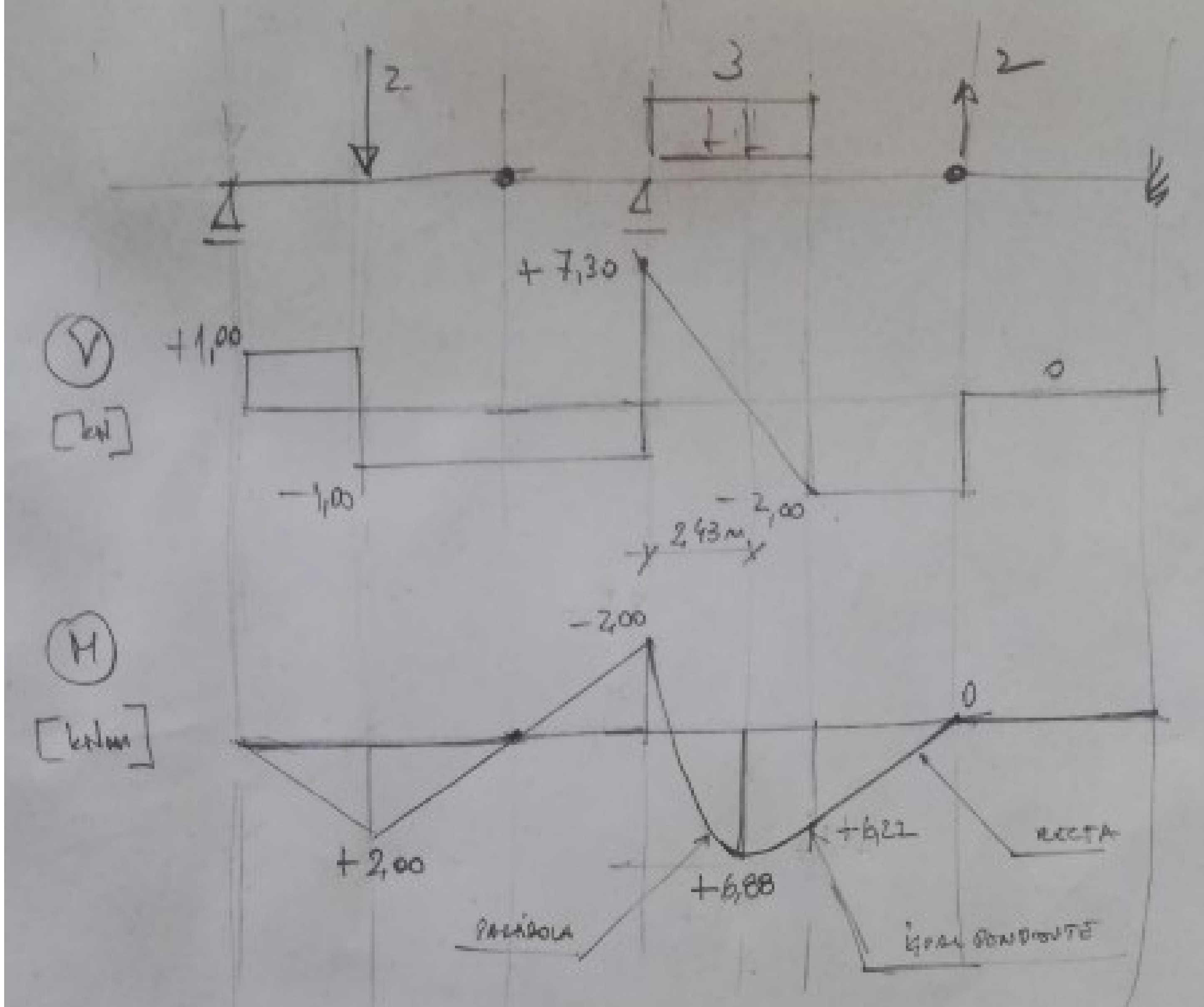


1er Parcial 2018



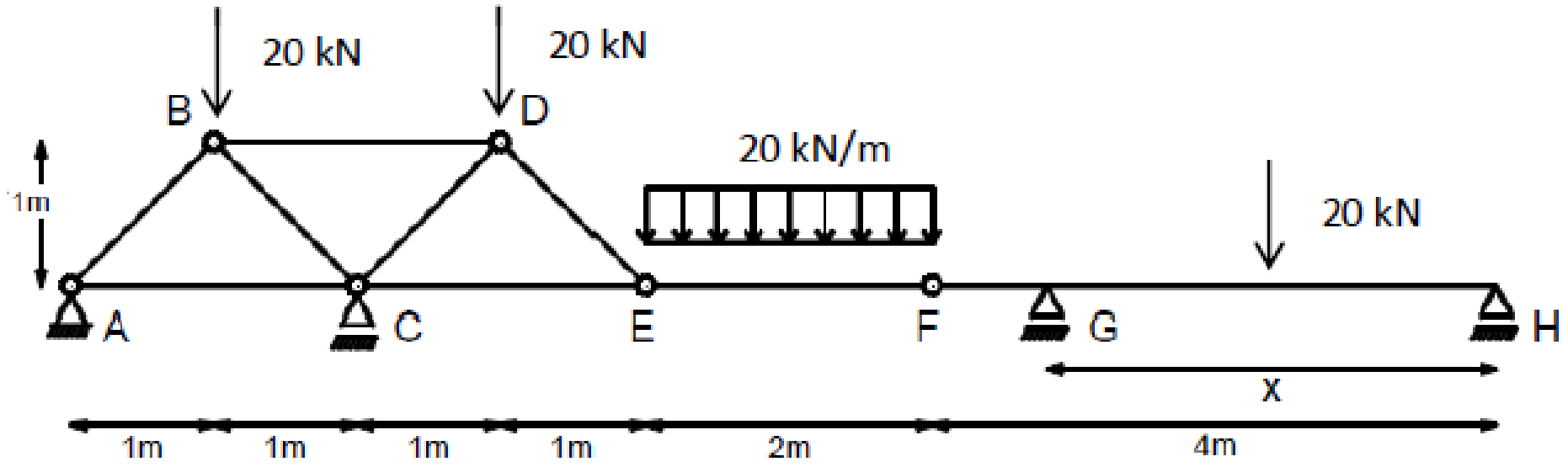


a) Hallar el valor de *a* para que el momento flector en el empotramiento E sea nulo.
b) Para el valor de *a* obtenido trazar los diagramas de solicitaciones.
c) Trazar el diagrama de tensiones normales en la sección donde se produce la máxima tensión normal.

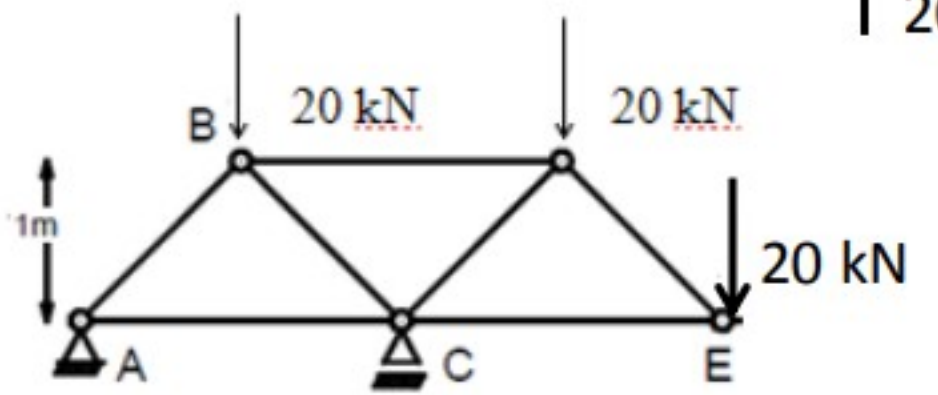


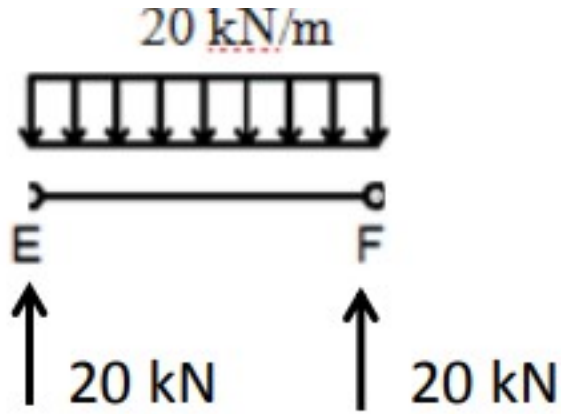
ERROR COMETIDO POR AJUSTAR "a" A 3,10 ES 0,02 kNm.

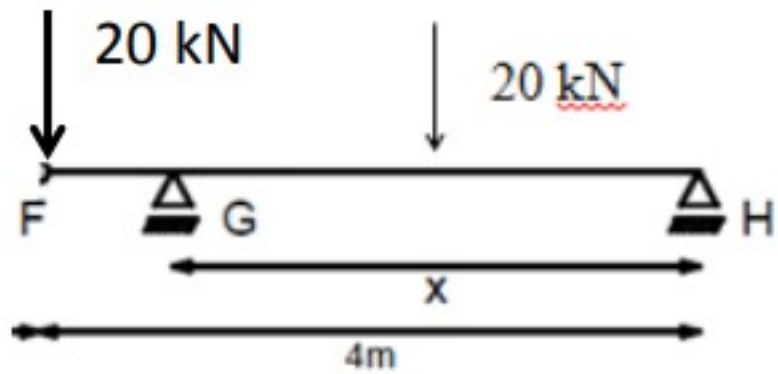
1er Parcial 2017



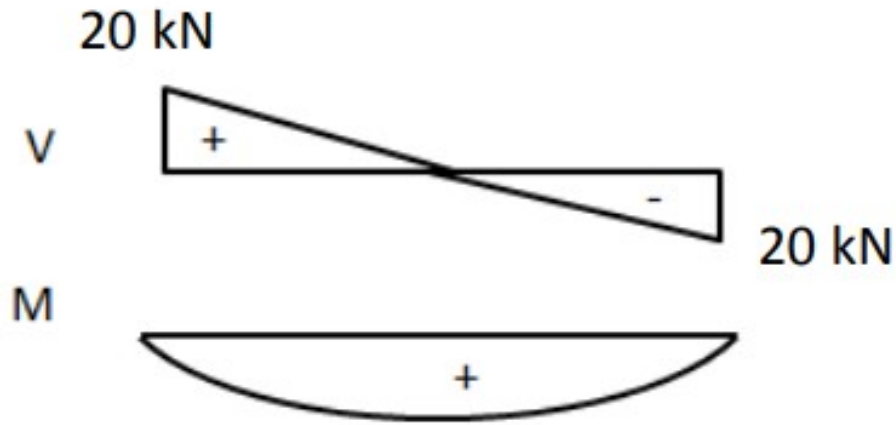
a) Hallar el valor de x (distancia entre G y H) de modo que el momento máximo positivo en el tramo EF sea igual al momento máximo positivo en GH.


B
20 kN
20 kN
1m
20 kN
A
C
E


20 kN/m
E
F
20 kN
20 kN

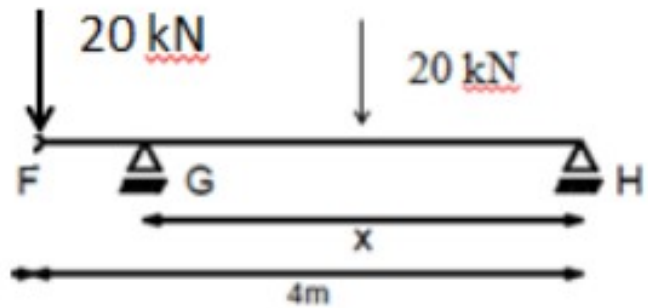

20 kN
20 kN
F
G
H
x
4m

M_{max} en EF:

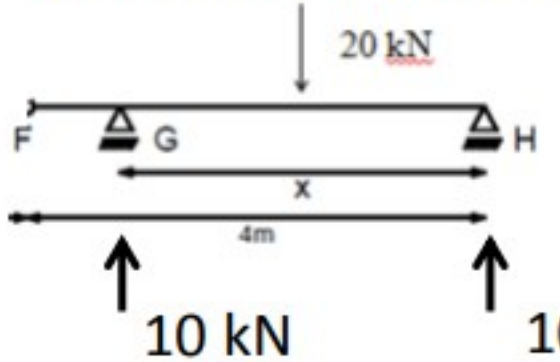


Mmax=10 kN.m= 20 kN. 1m/2

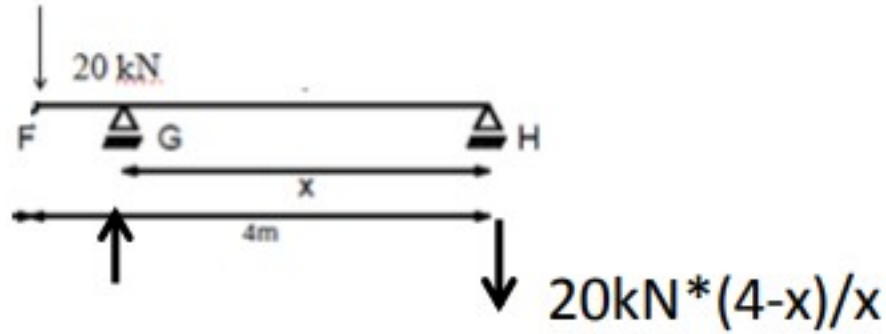
M_{max} positivo en FGH:



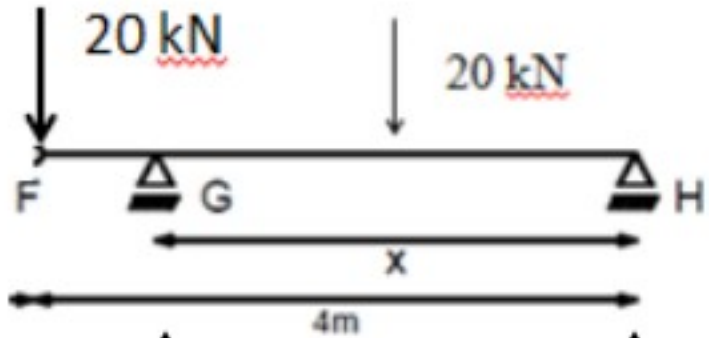
Aplicando superposicion:



+



RH=10 kN- 20kN*(4-x)/x

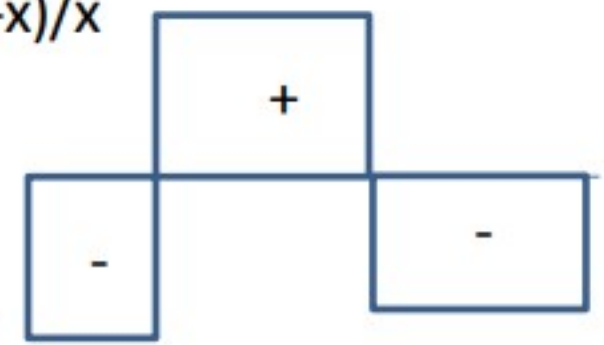


RG=30 kN+20 kN.(4-x)/x

RH=10 kN- 20 kN.(4-x)/x

V(kN)

10 kN+20 kN.(4-x)/x



20 kN

-10 kN+20 kN.(4-x)/x

M(kN.m)

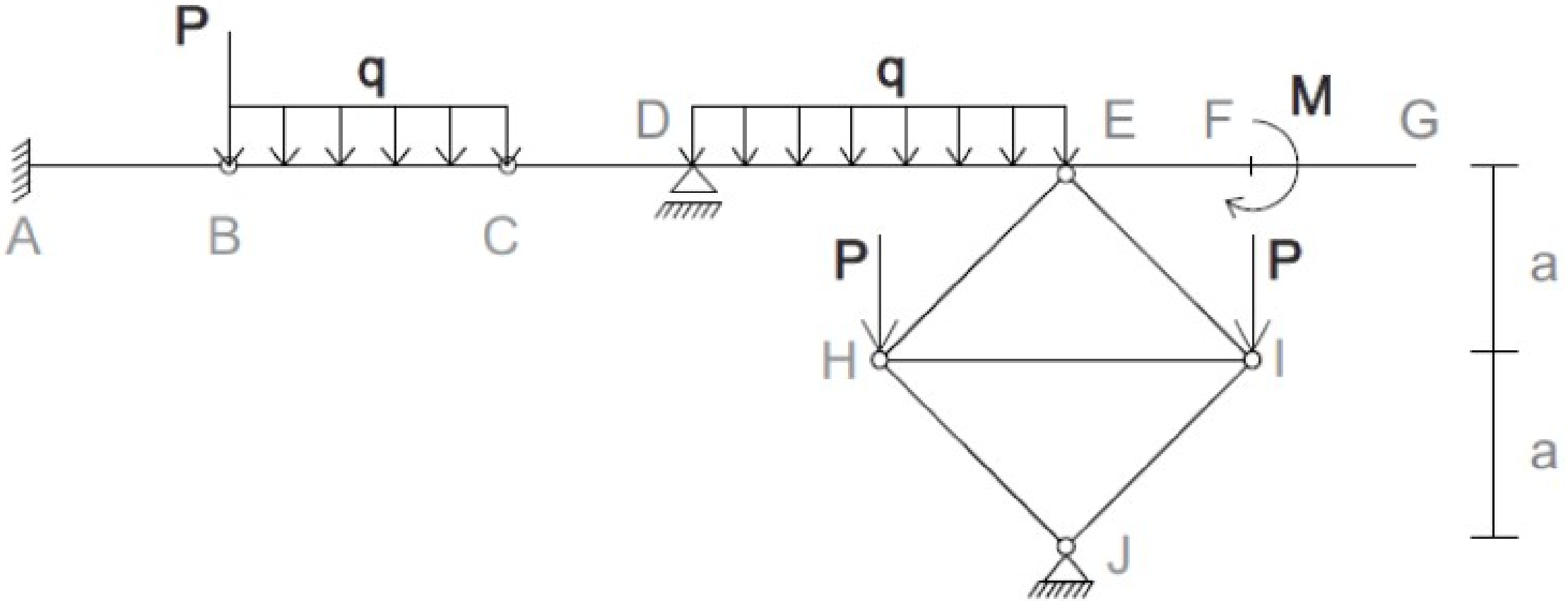
(4-x).20 kN

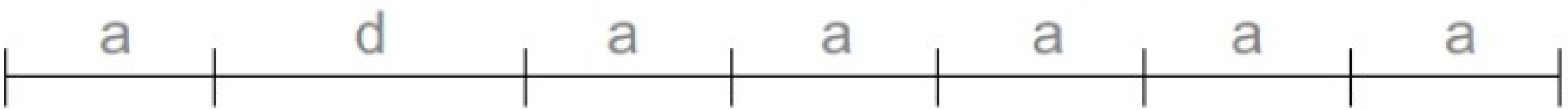
M_{max}= x/2.(+10 kN-20 kN.(4-x)/x)

Igualando M_{max} en EF y M_{max} en FGH→ 10 kN.m = x/2.(10 kN-20 kN.(4-x)/x)

Despejando→ **x=3.33 m**

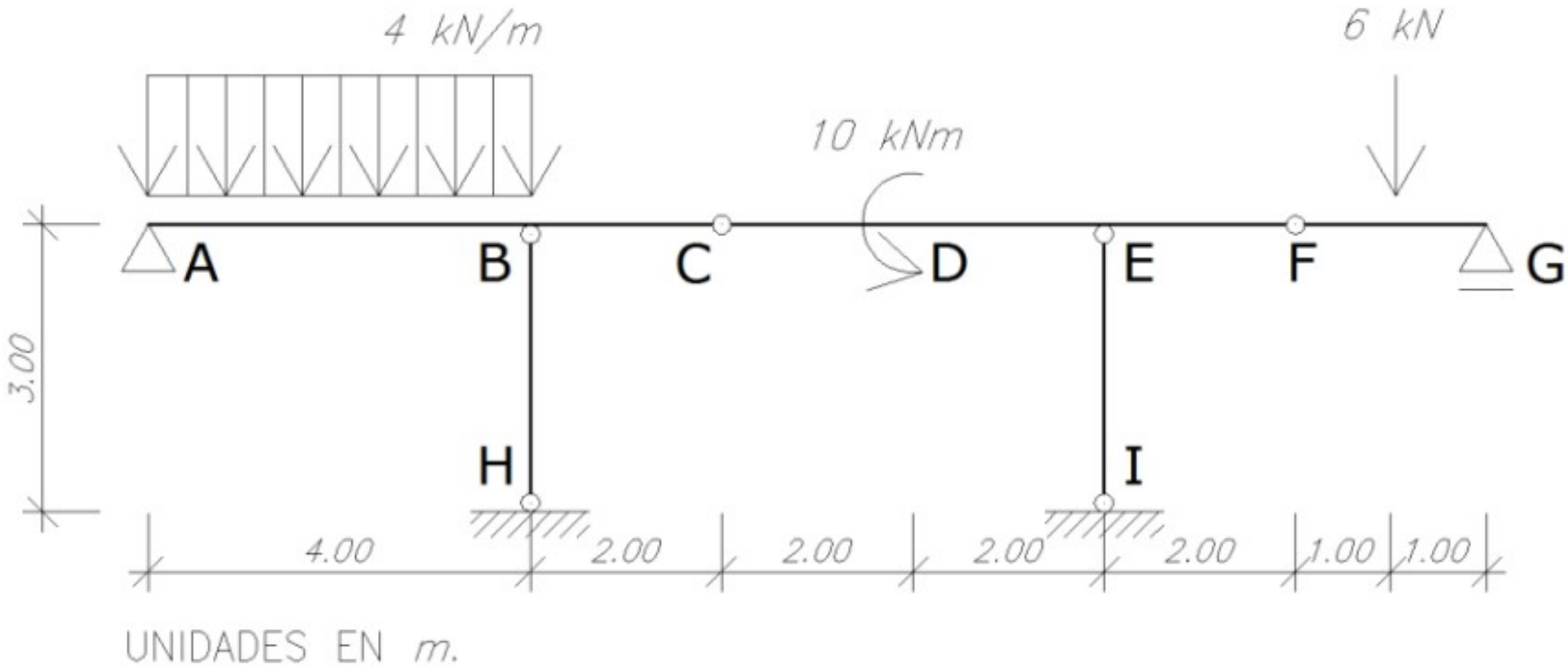
Hallar d para que no se supere el momento admisible α Nm en la barra AB.

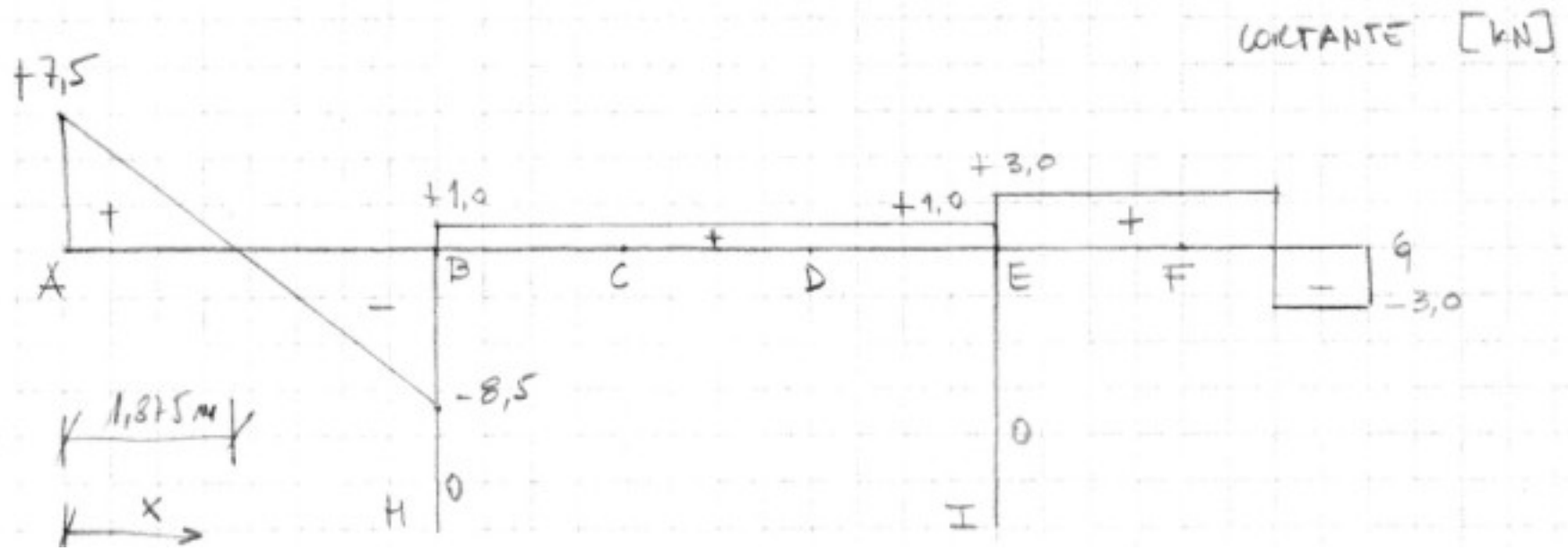


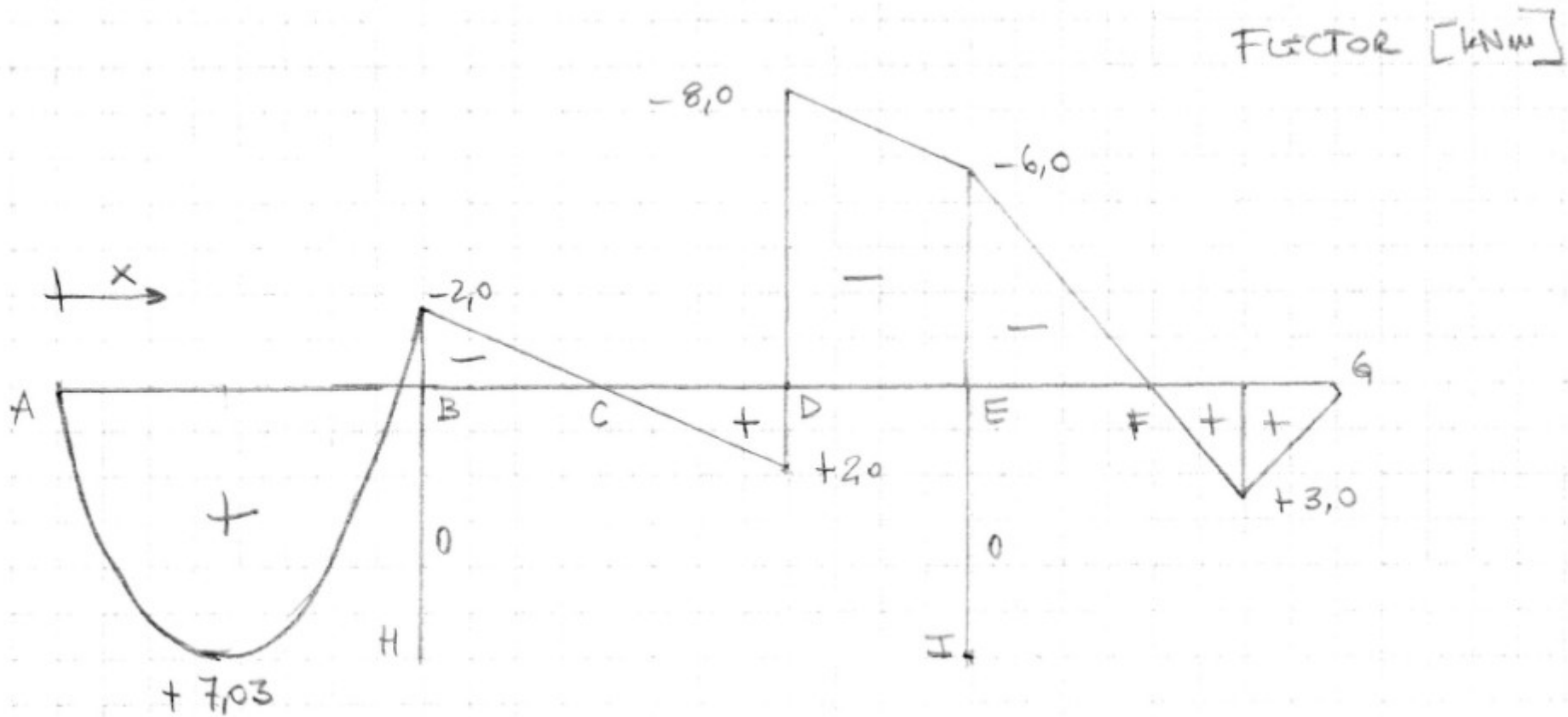


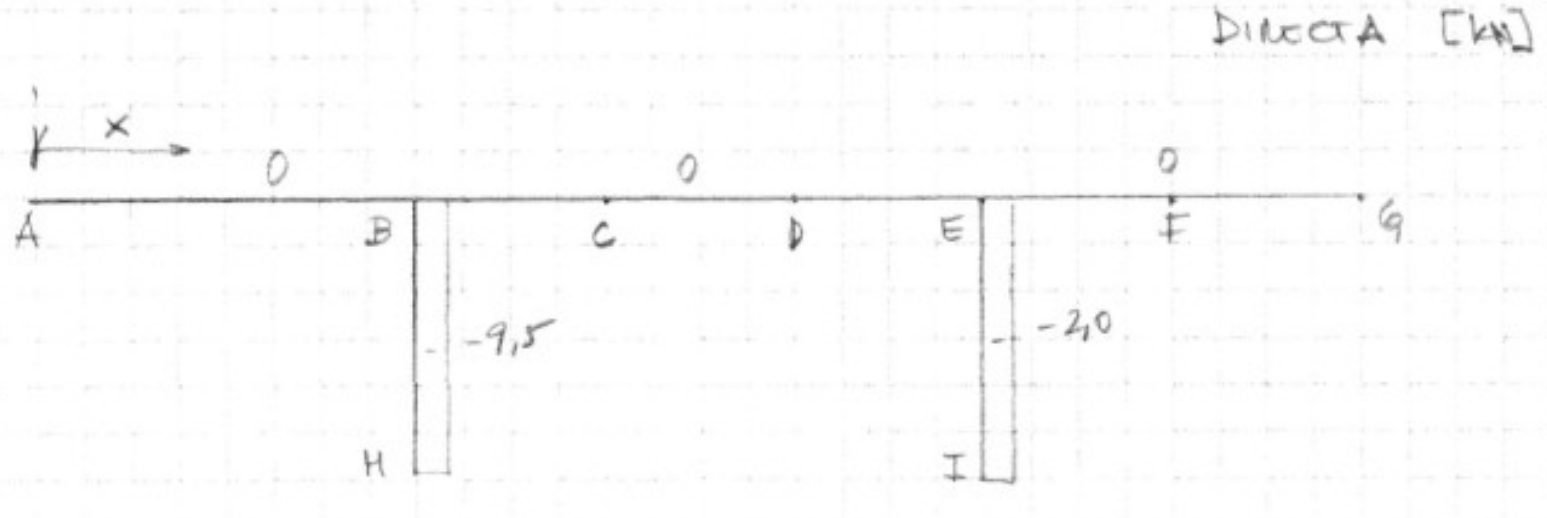
a) Trazar los diagramas de solicitaciones.

b) Trazar los diagramas de tensiones normales en las secciones donde se producen el máximo momento flector positivo y el máximo momento flector negativo.




TAGLIANTE [kN]
+7,5
+
A
−
1,875 m
X
+1,0
B
+
C
+
D
+1,0
−8,5
0
H
+3,0
E
+
F
G
−
−3,0
0
I


FLECTOR [kNm]
-8,0
-6,0
-2,0
+ x
A
B
C
D
E
F
G
+2,0
+3,0
+7,03
0
0
H
I


DIRETTA [kN]
Y
X
0
0
0
A
B
C
D
E
F
G
-9,5
-2,0
H
I