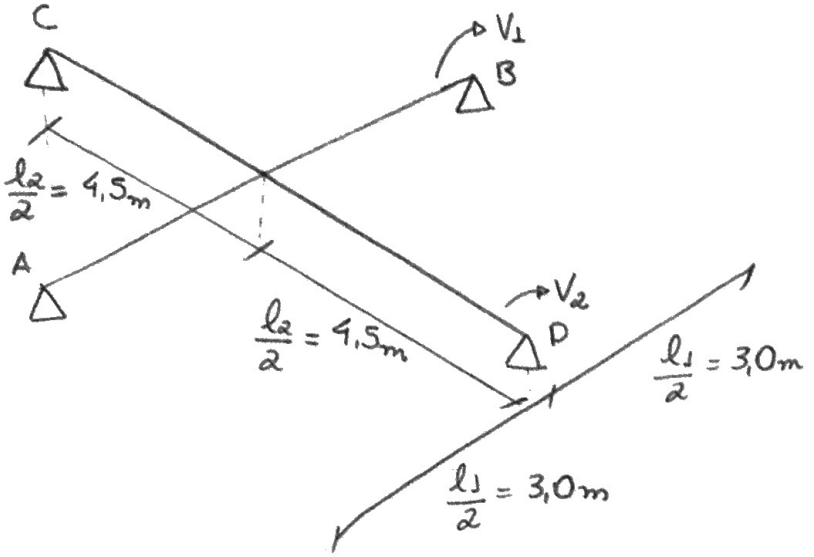
Exercício 5:

$l_1 = 6{,}0\,m$

$l_2 = 9{,}0\,m$



Obs: a maior parcela da carga é transferida para viga de menor vão, logo V_2 se apoia em V_1

→ Calcular o diagrama do momento fletor de V_1 e V_2

1º) Cálculo das cargas

- Carga da laje: $h_L = 0{,}07\,m$

$P_{L,V_1} = 25\,KN/m^3 \times 0{,}07\,m \times \overbrace{1{,}5\,m}^{\text{zona de influência}}$

$P_{L,V_1} = 2{,}625\,KN/m$

$P_{L,V_2} = 25\,KN/m^3 \times 0{,}07\,m \times 1{,}0\,m$

$P_{L,V_2} = 1{,}75\,KN/m$

- Peso próprio da viga: $h_v = 0{,}33\,m$ $b = 0{,}15\,m$

$PP_{,V_1} = 25\,KN/m^3 \times 0{,}33 \times 0{,}15 \Rightarrow PP_{,V_1} = 1{,}2375\,KN/m$

$PP_{,V_2} = 25\,KN/m^3 \times 0{,}33 \times 0{,}15 \Rightarrow PP_{,V_2} = 1{,}2375\,KN/m$

- Carga acidental

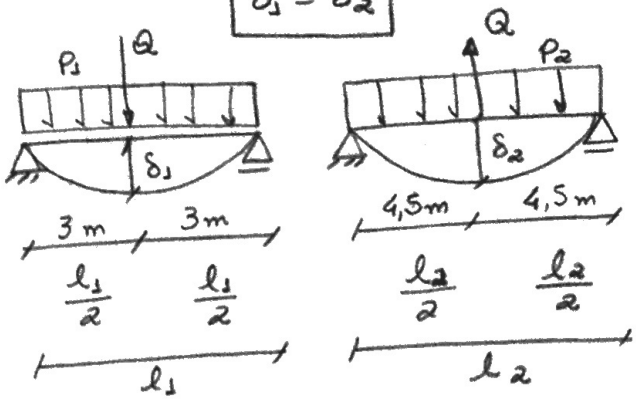
$q_{,V_1} = 2\,KN/m^2 \times 1{,}5\,m \Rightarrow q_{,V_1} = 3{,}0\,KN/m$

$q_{,V_2} = 2\,KN/m^2 \times 1{,}0\,m \Rightarrow q_{,V_2} = 2{,}0\,KN/m$

- Carga total: $p = P_L + PP + q \Rightarrow$ $P_1 = 6{,}8625\,KN/m$, $P_2 = 4{,}9875\,KN/m$

2º) Compatibilidade de deslocamento

$\boxed{\delta_1 = \delta_2}$



$\delta_1 = \delta_1^{P_1} + \delta_1^{Q}$ $\qquad$ $\delta_2 = \delta_2^{P_2} + \delta_2^{Q}$

$\delta_1 = \frac{5 P_1 l_1^4}{384 EI} + \frac{Q l_1^3}{48 EI}$ $\qquad$ $\delta_2 = + \frac{5 P_2 l_2^4}{384 EI} - \frac{Q l_2^3}{48 EI}$

- Compatibilidade:

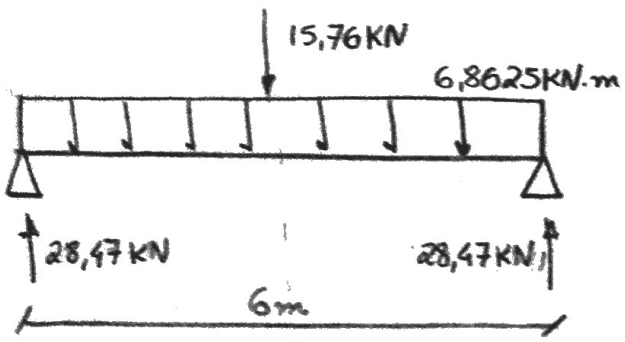
$$\frac{5 P_1 l_1^4}{\cancel{384}\,\cancel{EI}} + \frac{Q l_1^3}{\cancel{48}\,\cancel{EI}} = \frac{5 P_2 l_2^4}{\cancel{384}\,\cancel{EI}} - \frac{Q l_2^3}{\cancel{48}\,\cancel{EI}}$$

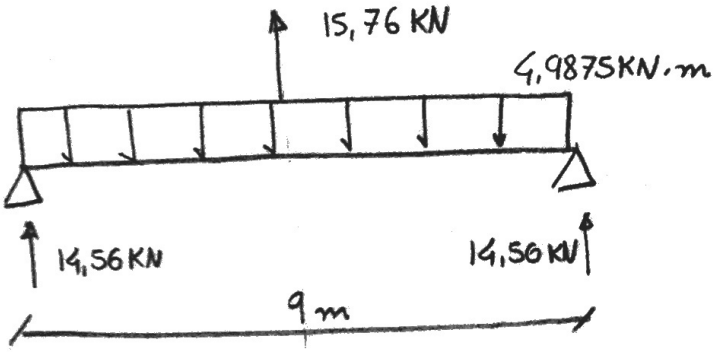
$$Q(l_1^3 + l_2^3) = \frac{5}{8}\left(P_2 l_2^4 - P_1 l_1^4\right)$$

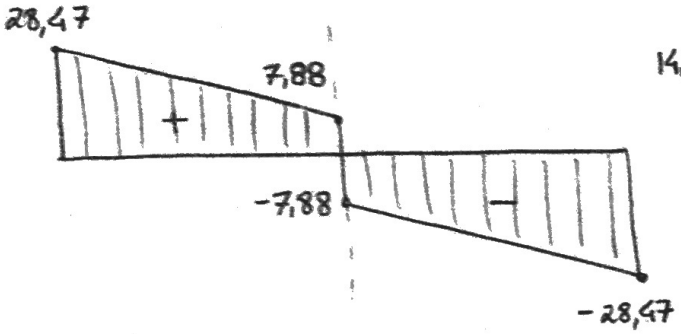
$$Q = \frac{5}{8}\,\frac{(P_2 l_2^4 - P_1 l_1^4)}{(l_1^3 + l_2^3)}$$

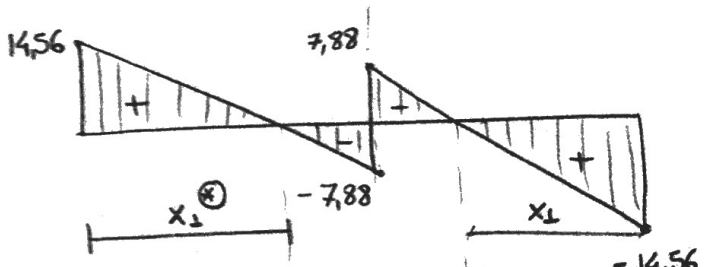
$\boxed{Q = 15{,}76\,KN}$

3º) Diagrama de momento fletor

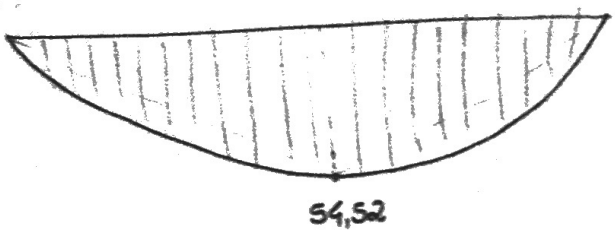




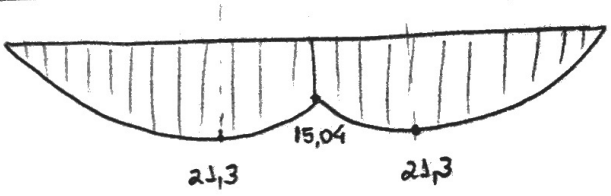




M



M



⊛ $\frac{14,56}{x_1} = \frac{7,88}{4,5 - x_1}$

$7,88\, x_1 = 14,56 \cdot 4,5 - 14,56\, x_1$

$\boxed{x_1 = 2,92\ m}$