B1T4N0331A

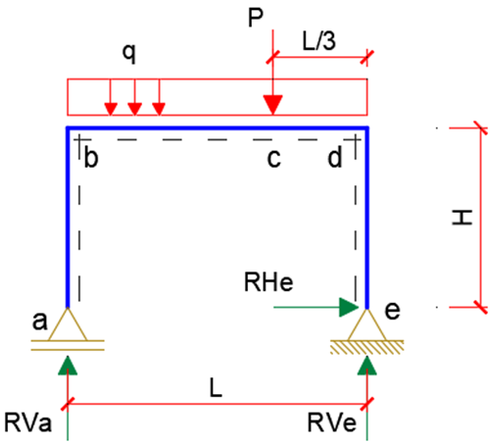
Considerando o modelo estrutural abaixo responda os questionamentos:

$P := 80\ kN$

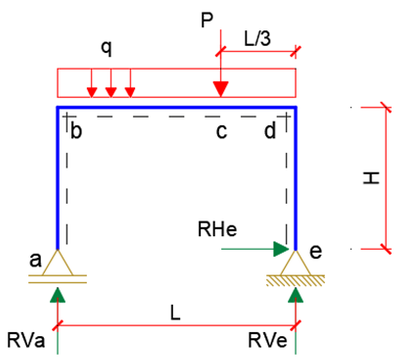
$q := 20\ \frac{kN}{m}$

$L := 7\ m$

$H := 4\ m$



Q01) Qual o valor do momento fletor no "c"? [em kNm e sinal conforme a convenção de diagramas]
Q02) Qual o valor do esforço cortante infinitesimalmente à esqueda do ponto "c"? [em kN e sinal conforme a convenção de diagramas]
Q03) Qual o valor do esforço cortante infinitesimalmente à direita do ponto "c"? [em kN e sinal conforme a convenção de diagramas]



Cálculo das Reações de Apoio:

$\Sigma Fh := 0$ $\quad RHe := 0\ kN$

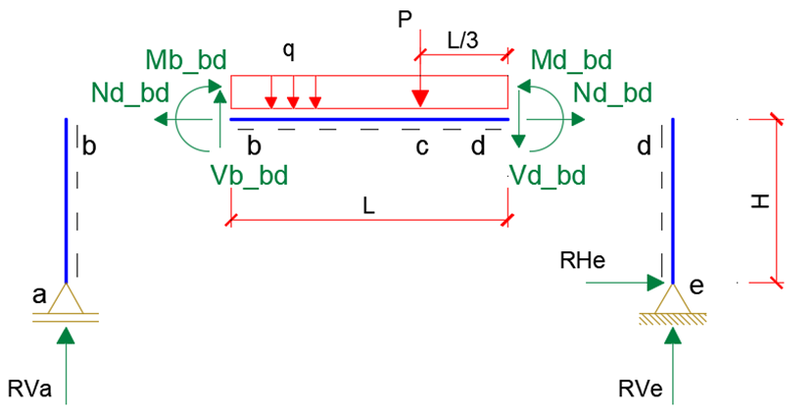
$\Sigma Me := 0$ $\quad$ giro horário (+)

$RVa \cdot L - P \cdot \frac{L}{3} - q \cdot L \cdot \frac{L}{2} = 0$ $\quad RVa := \frac{1}{L} \cdot \left(P \cdot \frac{L}{3} + q \cdot L \cdot \frac{L}{2} \right) = 96,667\ kN$

$\Sigma Fv := 0$ $\quad$ para cima (+)

$RVe + RVa - P - q \cdot L = 0$ $\quad RVe := -RVa + P + q \cdot L = 123,33\ kN$

Equiliíbrio Inidividual da Barra "bcd":



$Mb_bc := 0\ kN\ m$

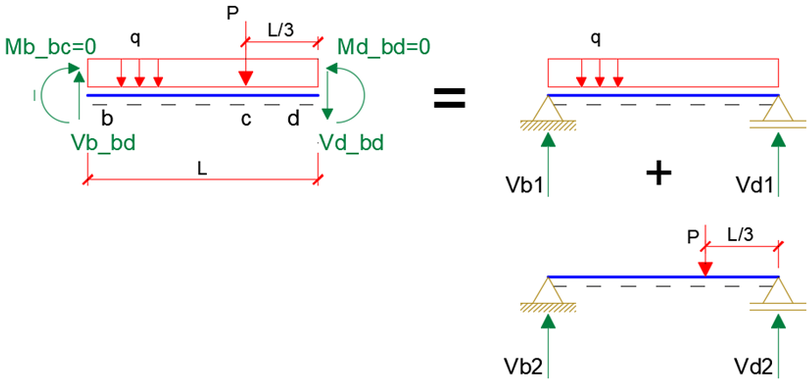
$Nb_bd := 0\ kN$

$Vb_bd := RVa = 96,6667\ kN$

$Md_bd := 0\ kN\ m$

$Nd_bd := 0\ kN$

$Vd_bd := -RVe = -123,3333\ kN$



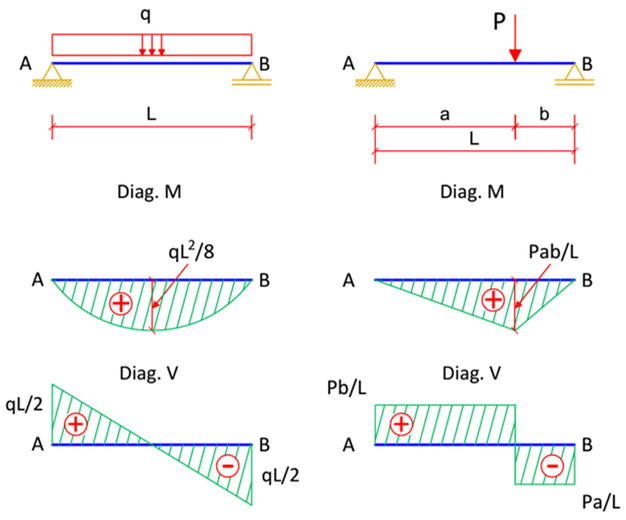
$$Vb1 := \frac{q \cdot L}{2} = 70\ kN$$

$$Vd1 := \frac{q \cdot L}{2} = 70\ kN$$

$$\Sigma Md := 0 \qquad Vb2 \cdot L - P \cdot \frac{L}{3} = 0$$

$$Vb2 := \frac{P}{3} = 26,6667\ kN$$

$$Vd2 := \frac{2 \cdot P}{3} = 53,3333\ kN$$



$$Vb1 + Vb2 = 96,67\ kN \qquad Vb_bd = 96,667\ kN$$

$$Vd1 + Vd2 = 123,33\ kN \qquad Vd_bd = -123,33\ kN$$

$$a := \frac{2}{3} \cdot L \qquad b := \frac{1}{3} \cdot L$$

Máximo momento devido a carga P:

$$MP_em_c := \frac{P \cdot a \cdot b}{L} = 124,4444\ kN\ m$$

$$Mq_em_c := Vb1 \cdot a - q \cdot a \cdot \frac{a}{2} = 108,8889\ kN\ m$$

Resposta de Q01) $Mc := MP_em_c + Mq_em_c = 233,33\ kN\ m$

Cortantes:

$$VP_esq_c := P \cdot \frac{b}{L} = 26,6667\ kN$$

$$VP_dir_c := -P \cdot \frac{a}{L} = -53,3333\ kN$$

$$Vq_em_c := Vb1 - q \cdot a = -23,3333\ kN$$

Resposta de Q02) $Vc_esq := VP_esq_c + Vq_em_c = 3,3333\ kN$

Resposta de Q03) $Vc_dir := VP_dir_c + Vq_em_c = -76,6667\ kN$
