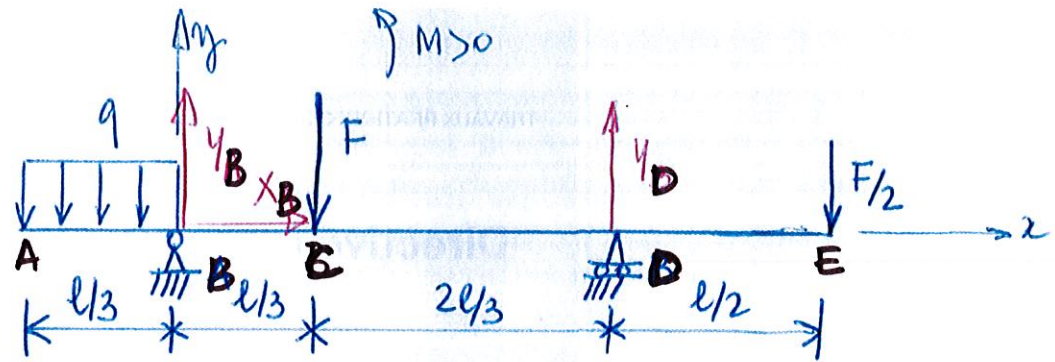


# Exercice 1

1.1.



1.2.

$$(1) \sum X_i = 0 \Leftrightarrow \boxed{X_B = 0}$$

$$(2) \sum Y_i = 0 \Leftrightarrow -\frac{ql}{3} + Y_B - F + Y_D - \frac{F}{2} = 0$$

$$(3) \sum M_{B/A} = 0 \Leftrightarrow \frac{ql}{3} \times \frac{1}{2} \times \frac{l}{3} - F \times \frac{l}{3} + Y_D \times l - \frac{F}{2} \times (l + \frac{l}{2}) = 0$$

$$(3) \Leftrightarrow Y_D \times l = \frac{Fl}{3} + \frac{3Fl}{4} - \frac{ql^2}{18}$$

$$\boxed{Y_D = \frac{13F}{12} - \frac{ql}{18}}$$

$$(2) \Leftrightarrow Y_B = \frac{3F}{2} + \frac{ql}{3} - Y_D \Leftrightarrow Y_B = \frac{3F}{2} + \frac{ql}{3} - \frac{13F}{12} + \frac{ql}{18}$$

$$\boxed{Y_B = \frac{5F}{12} + \frac{7ql}{18}}$$

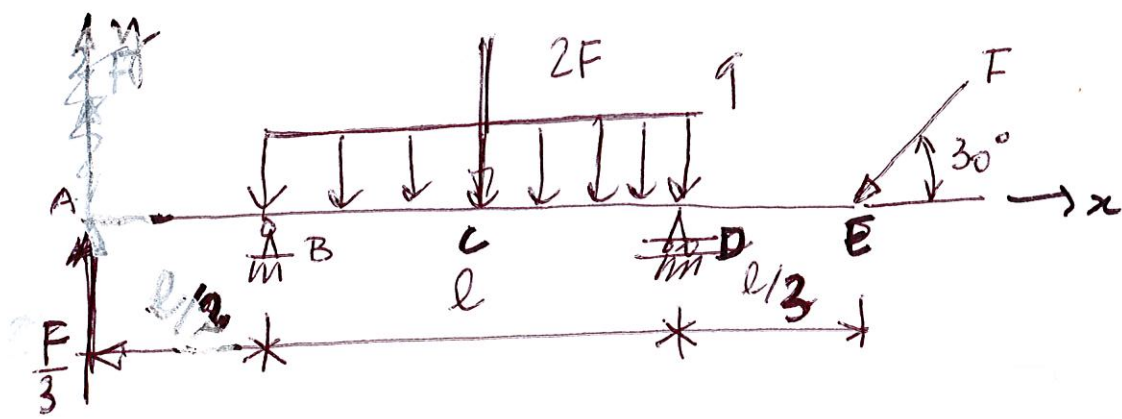
1.3.

$$Y_B = Y_D \Leftrightarrow \frac{13F}{12} - \frac{ql}{18} = \frac{5F}{12} + \frac{7ql}{18}$$

$$\frac{8F}{12} = \frac{8ql}{18} \Leftrightarrow F = \frac{12ql}{18}$$

$$\Leftrightarrow \boxed{F = \frac{2ql}{3}}$$

(2)



$$X_B = F \frac{\sqrt{3}}{2}$$

$$-\frac{F}{3} \times \frac{l}{2} - \frac{ql^2}{2} + Y_D \times l - \frac{F}{2} \times \frac{4l}{3} = 0$$

$$Y_D = \frac{5F}{6} + \frac{ql}{2} - \frac{F}{2}$$

$$Y_D = \frac{14F}{6} + \frac{ql}{2}$$

$$Y_D = 2700 \text{ dan}$$

$$Y_B + Y_D - ql + \frac{F}{3} - \frac{F}{2} = 0$$

$$Y_B = ql + \frac{F}{6} - \frac{5F}{6} - \frac{ql}{2}$$

$$Y_B = \frac{ql}{2} - \frac{2F}{3} + F$$

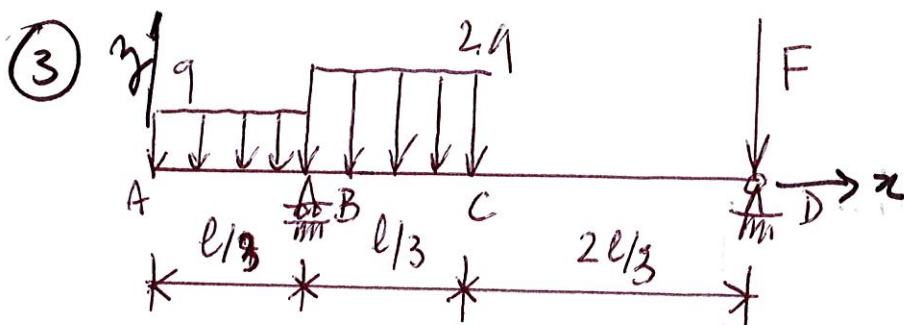
$$Y_B = \frac{ql}{2} + \frac{F}{3}$$

$$Y_B = 1800 \text{ dan}$$

$$M_{3B} = 3200 \text{ dan.m}$$

$$M_{3C} = - \left[ -\frac{F}{3} \left( l + \frac{l}{2} \right) - Y_B \times \frac{l}{2} + \frac{ql}{2} \times \frac{l}{4} \right]$$

$$M_{3C} = - \left( -\frac{Fl}{3} - \frac{Fl}{6} - \frac{ql^2}{4} - \frac{Fl}{6} + \frac{ql^2}{8} \right) = \frac{2Fl}{3} + \frac{ql^2}{8}$$



$$Y_B + Y_D - \frac{ql}{3} - \frac{2ql}{3} - F = 0 \Leftrightarrow Y_A + Y_D = ql + F$$

$$Y_D \times l + \frac{ql}{3} \times \frac{l}{6} - \frac{2ql}{3} \times \frac{l}{6} - Fl = 0$$

$$Y_D = -\frac{ql}{18} + \frac{ql}{9} + F \Leftrightarrow Y_D = \frac{ql}{18} + F$$

$$Y_B = ql + F - \frac{ql}{18} - F$$

$$Y_B = \frac{17ql}{18} = 22,7 \text{ kN} \quad Y_D = \frac{ql}{18} + F = 13,3 \text{ kN}$$

Faire une coupe en C calculer les efforts internes

$$V_y = \frac{ql}{3} + \frac{2ql}{3} - \frac{17ql}{18} \Leftrightarrow V_y = \frac{ql}{18}$$

$$M_z = \left( \frac{ql}{18} + F \right) \times \frac{2l}{3} - F \times \frac{2l}{3}$$

$$M_z = \frac{ql^2}{27}$$

$$M_z = 5,3 \text{ kN.m}$$

