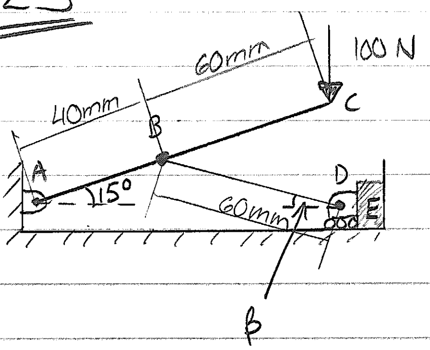
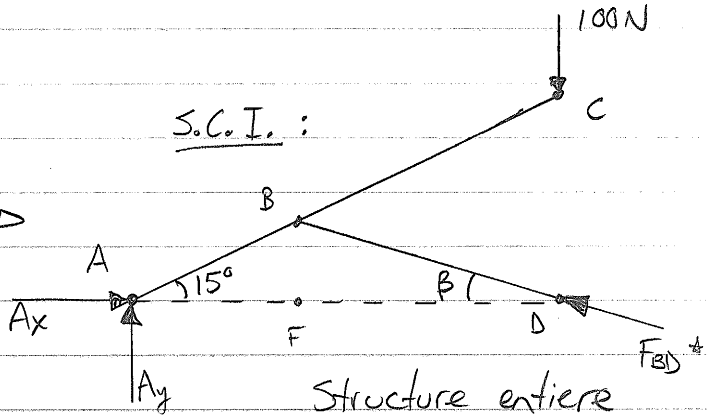
Solutions Exercices Semaine #9

6,123





* BD est un membre à 2 forces, donc on connait l'orientation de FBD...

$\overline{BF} = 40 \sin 15 = 10{,}35\,mm$

$\beta = \arcsin\left(\frac{\overline{BF}}{\overline{BD}}\right) = \sin^{-1}\left(\frac{10{,}35}{40}\right) = 9{,}936°$

$\overline{AD} = \overline{AF} + \overline{FD} = 40\cos 15 + 60 \cos 9{,}936 = 97{,}74\,mm$

Conditions d'équilibre:

$\Sigma M_A = 0 \qquad -100(97{,}74) + F_{BD} \sin(9{,}936)\cdot(97{,}74) = 0$

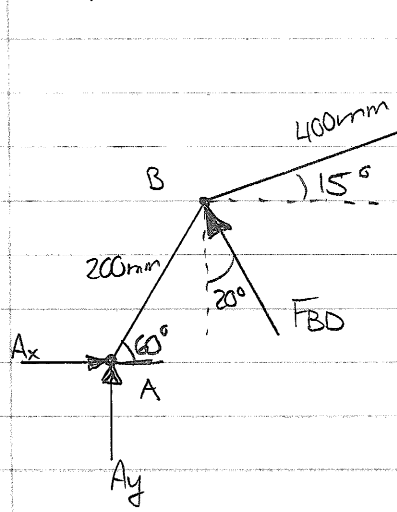
$F_{BD} = 572{,}7\ N$

composante horizontale: $F_{BD_x} = F_{BD} \cos(9{,}936)$

$\boxed{F_{BD_x} = 564{,}1\ N}$

6.125

Corps Isolé : membre AC :



P = 250N

Le membre BD est un membre à 2 forces donc on connait l'orientation de la force F_{BD}

a) $F_{BDy} = ?$ $\Rightarrow$ $\Sigma M_A = 0 = F_{BD}\cos 20 \cdot 200\cos 60 + F_{BD}\sin 20 \cdot 200\sin 60 - P(400\cos 15 + 200\cos 6$

$\Rightarrow F_{BD} = 793{,}6\,N$

Composante verticale : $F_{BDy} = F_{BD}\cos 20$

$$\boxed{F_{BDy} = 746\ N}$$

b) réactions au point A

$\Sigma F_x = 0$ $\quad A_x - F_{BD}\sin 20 = 0$ $\Rightarrow$ $\boxed{A_x = 271{,}4\,N \rightarrow}$

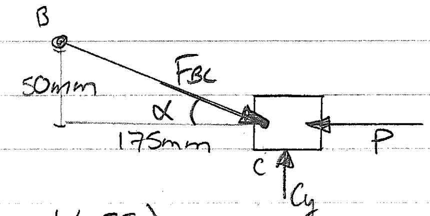
$\Sigma F_y = 0$ $\quad A_y + F_{BD}\cos 20 - P = 0$

$$\boxed{A_y = 495{,}7\ N \downarrow}$$

6,129

Pour a) et b) $\overline{BC}$ est un membre à 2 forces, donc on connait la direction de la force.

Corps isolé : Piston



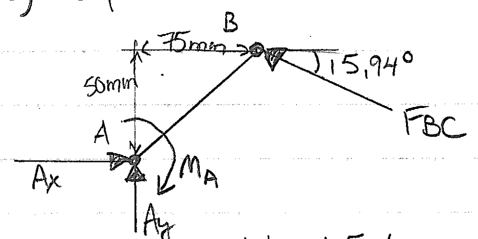
$$\alpha = \tan^{-1}\left(\frac{50}{175}\right) = 15{,}94°$$

$$\Sigma F_x = 0 \qquad F_{BC_x} - P = 0$$

$$F_{BC_x} = P = F_{BC}\cos\alpha$$

$$F_{BC_x} = 0{,}9615\, F_{BC} = P$$
$$F_{BC_y} = F_{BC}\sin\alpha = 0{,}275\, F_{BC}$$

a) Corps isolé : membre AB



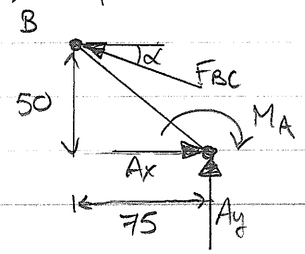
$M_A = 1{,}5$ kN·m
$= 1500$ kN·mm

$$\Sigma M_A = 0$$
$$-M_A + F_{BC}\cos(15{,}94)\cdot 50 + F_{BC}\sin(15{,}94)\cdot 7$$

$$\Rightarrow F_{BC} = 21{,}84 \text{ kN}$$

$$P = 0{,}9615\, F_{BC}$$
$$\boxed{P = 21 \text{ kN}}$$

b) Corps isolé : membre AB



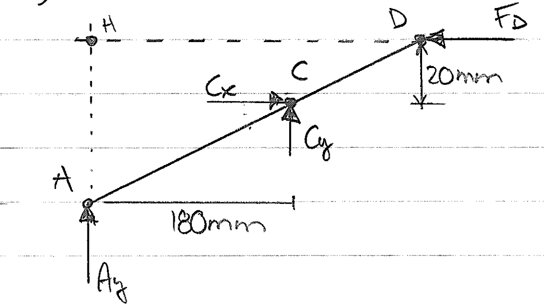
$$\Sigma M_A = 0$$
$$-M_A + F_{BC}\cos(15{,}94)\cdot 50 - F_{BC}\sin(15{,}94)\cdot 75$$

$$\Rightarrow F_{BC} = 54{,}6 \text{ kN}$$

$$\boxed{P = 52{,}5 \text{ kN}}$$

6.166

a) Corps isolé : Membre ACD

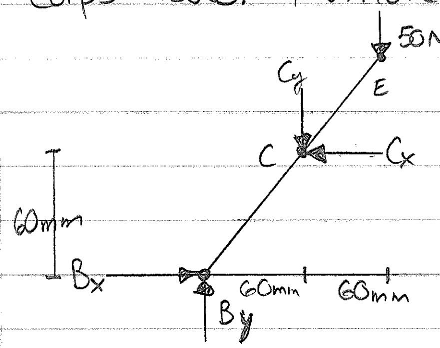


$\Sigma M_H = 0$

$C_x(20) + C_y(180) = 0$

$C_x = -9C_y$ (eq. 1)

Corps isolé: Membre BCE



$\Sigma M_B = 0$

$-50(120) - C_y(60) + C_x(60) = 0$

$-6000 - 60C_y + (-9C_y)(60) = 0$

$\therefore$ $\boxed{C_y = 10\,N}$

eq 1 $\Rightarrow$ $\boxed{C_x = -90\,N}$

$\Sigma F_x = 0$ $B_x = C_x$

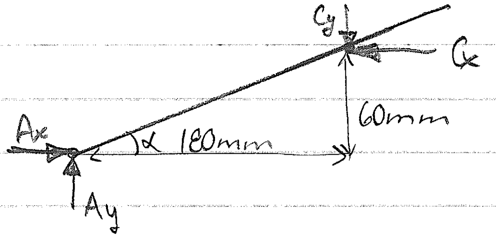
$\boxed{B_x = -90\,N}$

$\Sigma F_y = 0$ $B_y - 50 - C_y = 0$

$\boxed{B_y = 60\,N}$

b) Corps isolé: Membre AC

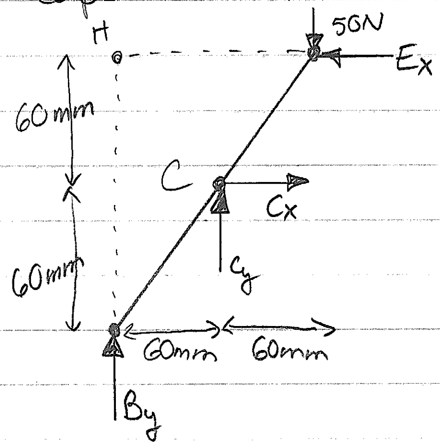
→ C'est un membre à 2 forces.



$\dfrac{C_x}{180} = \dfrac{C_y}{60}$ $\therefore$ $C_x = 3C_y$

(EQ. 2)

Corps isolé : membre BCE



$\Sigma M_H = 0$

$-50(120) + C_y(60) + C_x(60) = 0$

$6000 = C_y(60) + 3C_y(60)$

$\boxed{C_y = 25\,N}$

Eq 2 → $\boxed{C_x = 75\,N}$

$\Sigma F_y = 0 \quad B_y + C_y - 50 = 0$

$\boxed{B_y = 25\,N}$