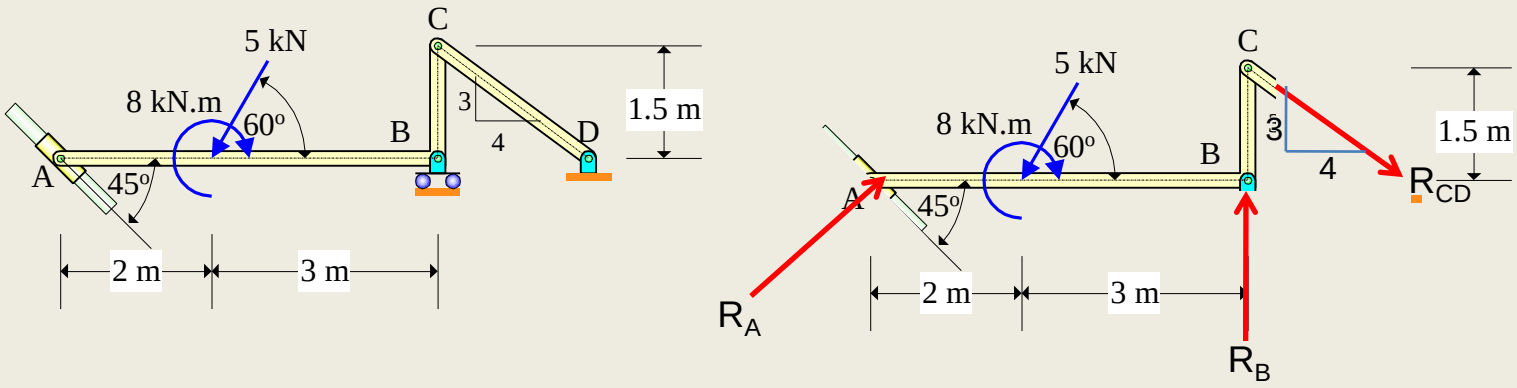
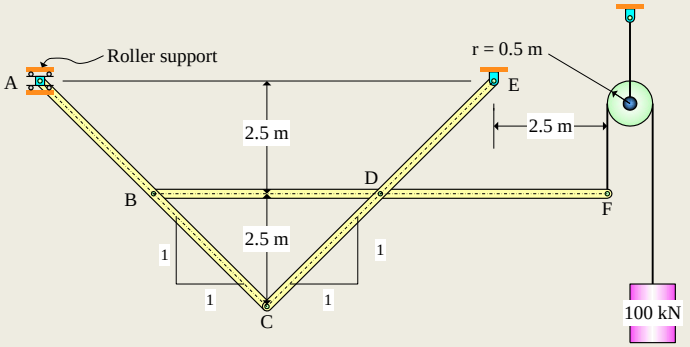
Assignment # 8 Solution

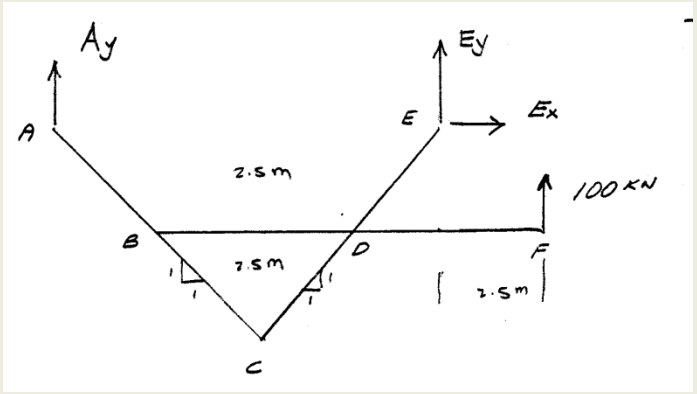
1. Find the force in the linkage ABC. The collar at A is smooth. Neglect the weight of each bar.



$R_A = 0.5$ kN $R_B = 5.59$ kN $R_{CD} = 2.683$ kN

2. Find the forces on bar CDE if the weight is 100 kN.





$\Sigma F_x = 0 \rightarrow \quad E_x = 0$

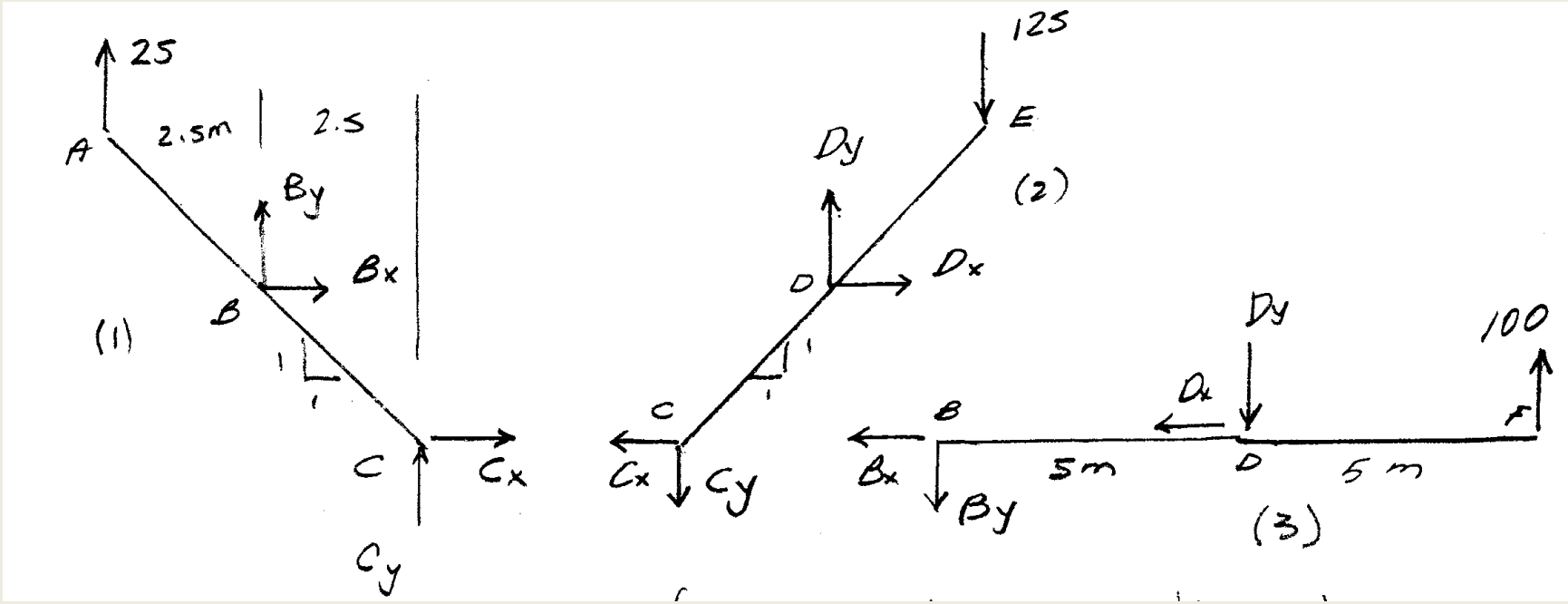
$\Sigma M_E = 0 \circlearrowleft \quad 100(2.5) - A_y(10) = 0$

$A_y = +25\,kN \quad \therefore \vec{A_y} = 25\,kN \uparrow$ ✓

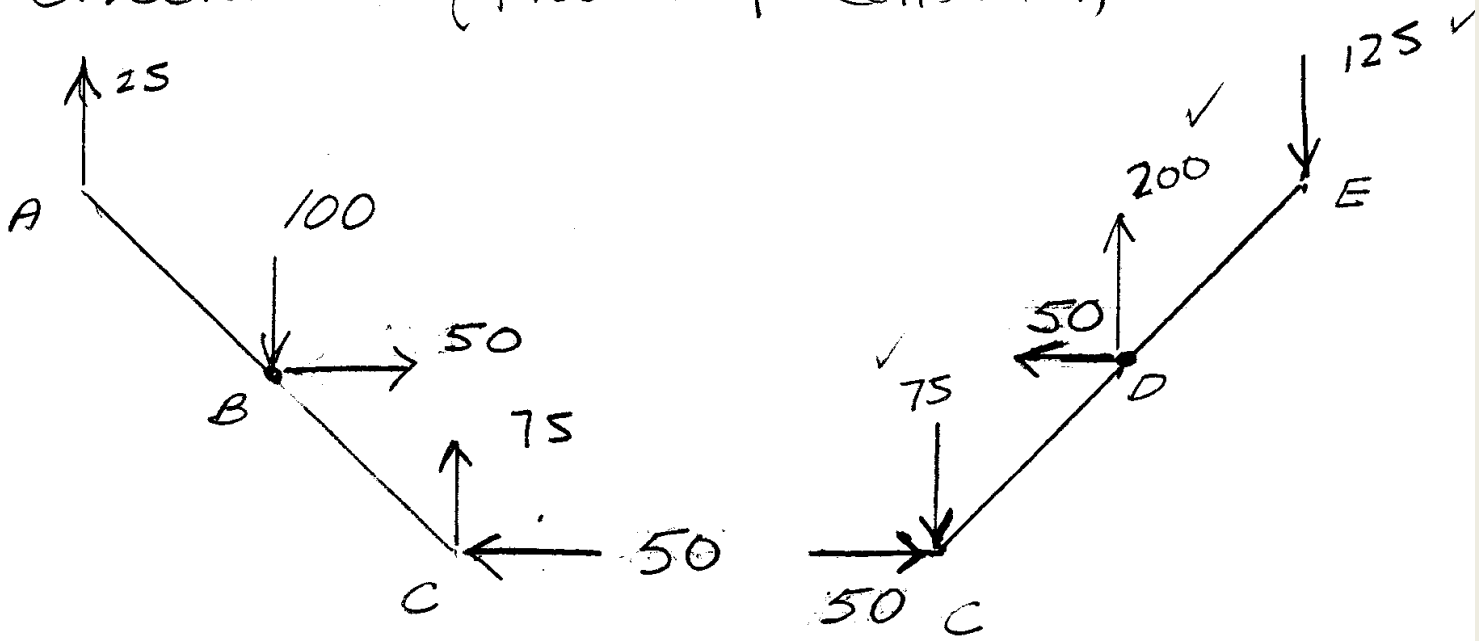
$\Sigma F_y = 0 \uparrow \quad A_y + E_y + 100 = 0$

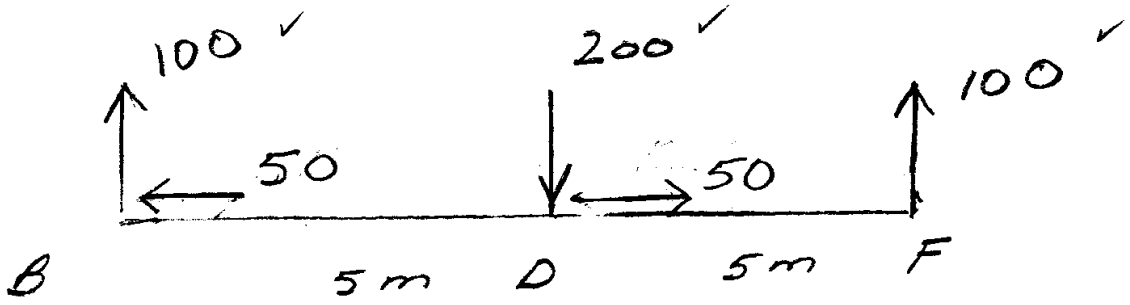
$25 + E_y + 100 = 0$

$E_y = -125\,kN \quad \therefore \vec{E_y} = 125\,kN \downarrow$ ✓


25
A
2.5m
2.5
By
Bx
B
(1)
C
Cx
Cy
125
E
Dy
(2)
D
Dx
C
Cx
Cy
Dy
100
Dx
B
F
Bx
5m
D
5m
By
(3)

Check. (Prob. 4.19 continued)

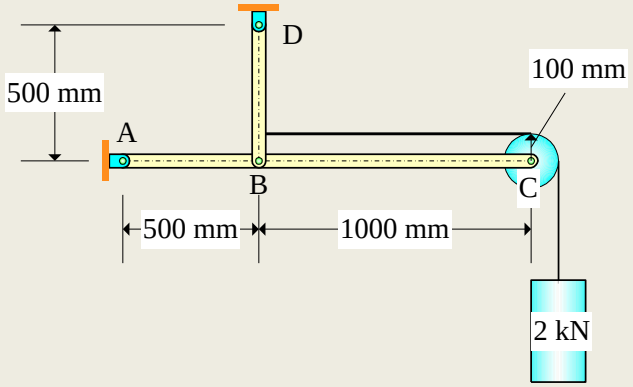


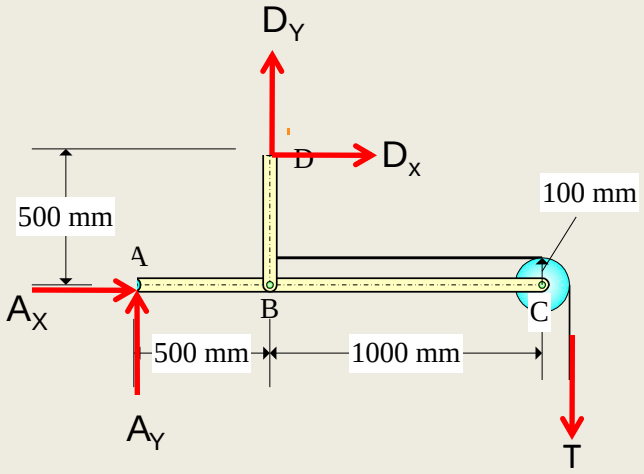


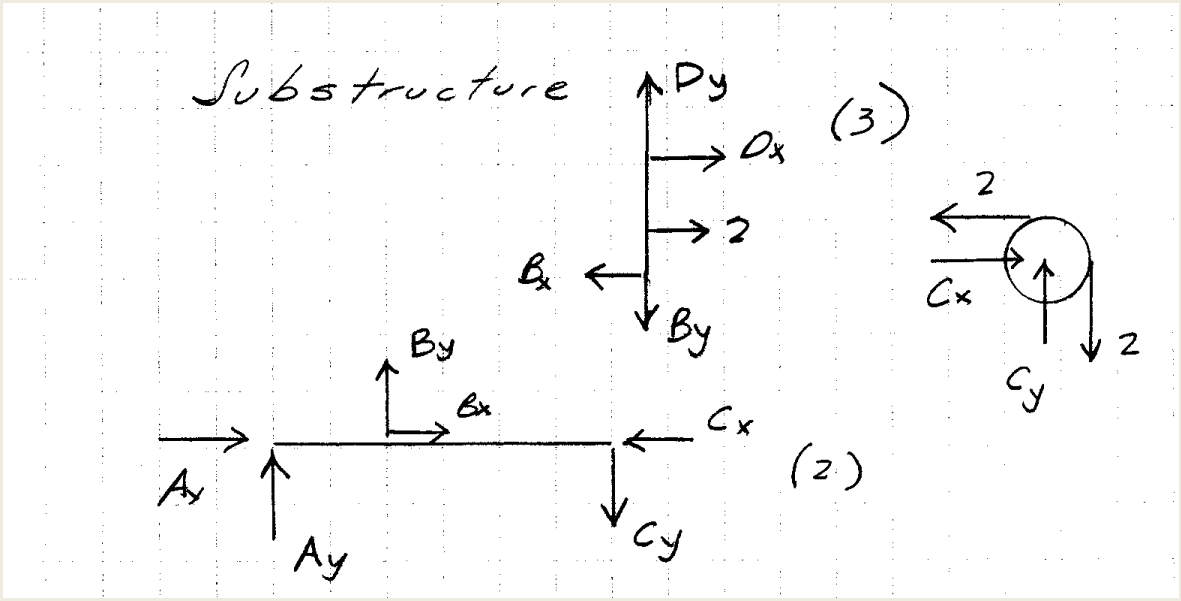
In the frame shown, the members are pin-connected and their weights can be neglected.

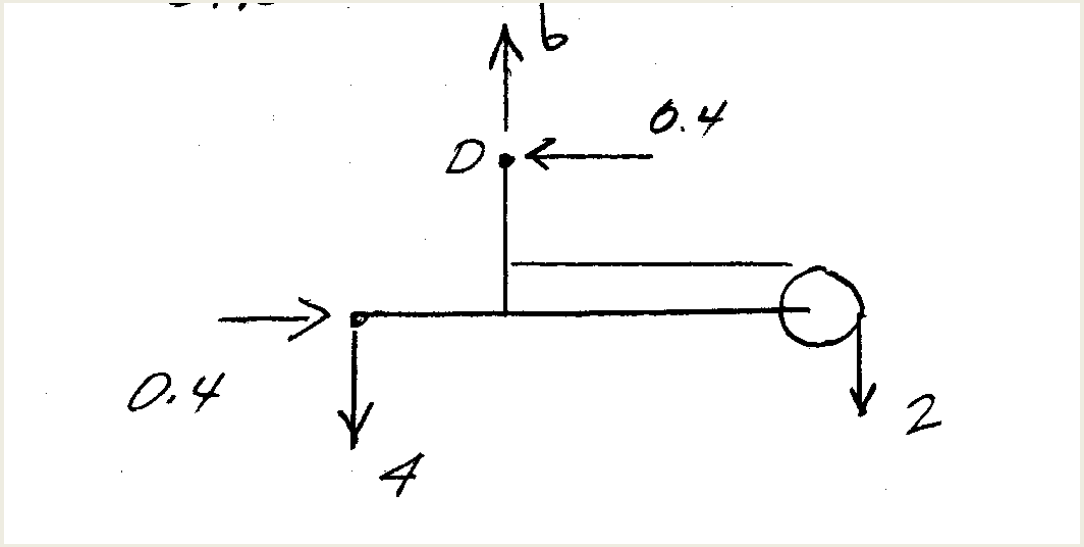
a) Find the external reactions on the frame at A and D.

b) Find the forces at A and B on member ABC.



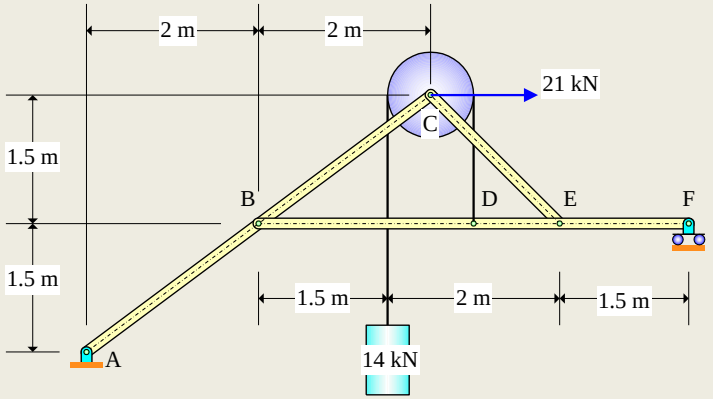


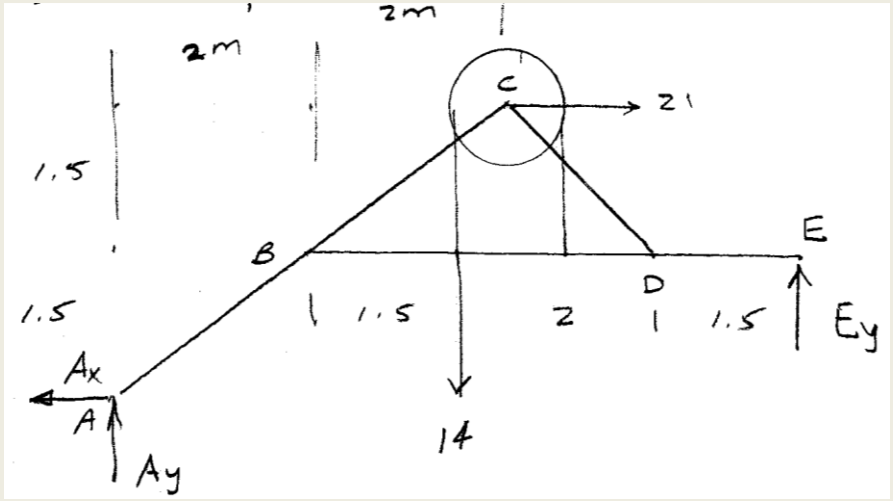

Substructure
Dy
Dx
(3)
2
Bx
By
2
Cx
Cy
2
By
Bx
Cx
Ay
Ay
Cy
(2)


b
0.4
D
0.4
4
2

In the frame shown in the figure, the members are pin-connected and their weights can be neglected. The 21 kN force is applied to the pin at C. Find

a) The reactions on the frame at A and F.
b) The components of the forces exerted on members ABC and BDF





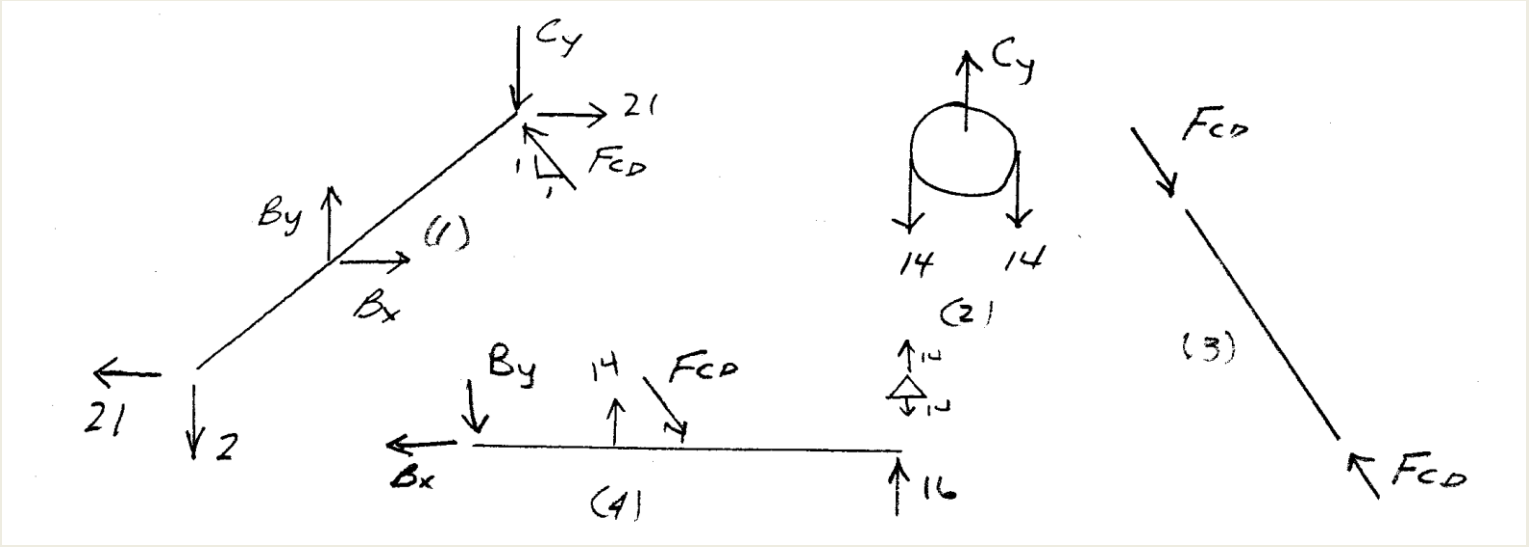
$\Sigma F_x = 0 \quad -A_x + 21 = 0 \quad A_x = +21\ kN \quad \vec{A}_x = 21\ kN \leftarrow$

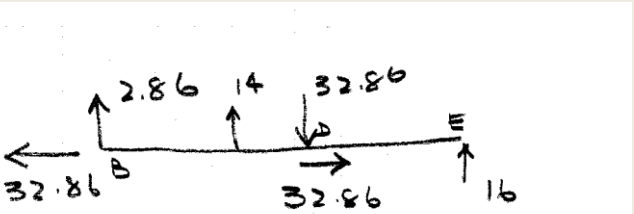
$\Sigma M_A = 0 \ \circlearrowleft \quad -14(3.5) - 21(3) + E_y(7) = 0$

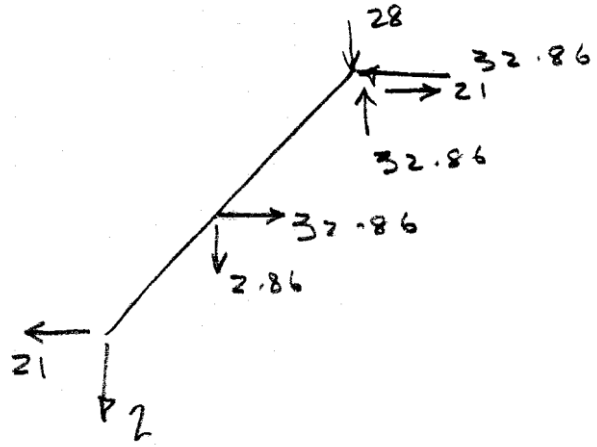
$E_y = \frac{112}{7} = +16\ kN \quad \vec{E}_y = 16\ kN \uparrow$

$\Sigma F_y = 0 \quad A_y - 14 + 16 = 0 \quad A_y = -2\ kN$

$\vec{A}_y = 2\ kN \downarrow$







$\vec{F}_{CD}$ = 46.47 kN $\angle_{1}^{1}\searrow$ on BDE