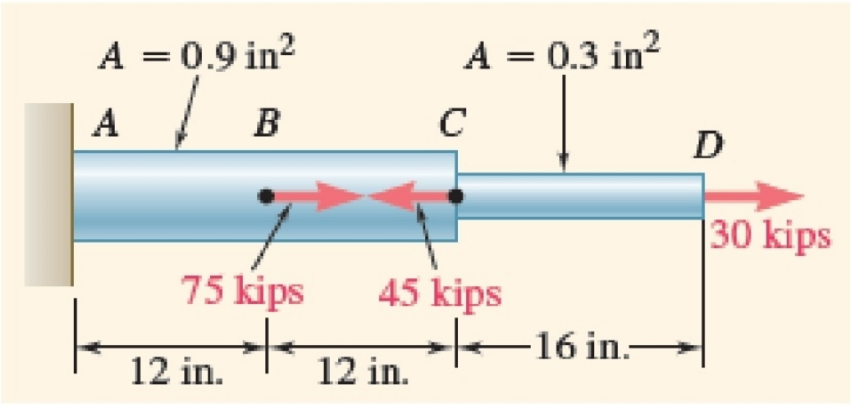
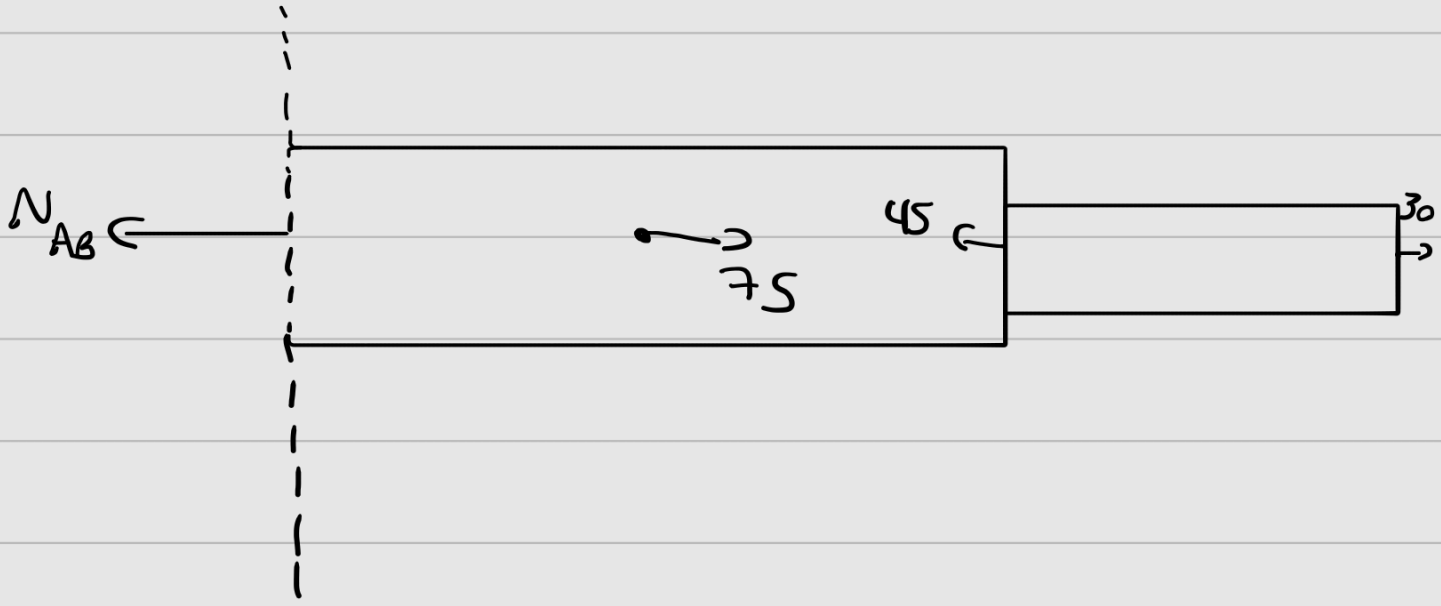
Problem 1 :

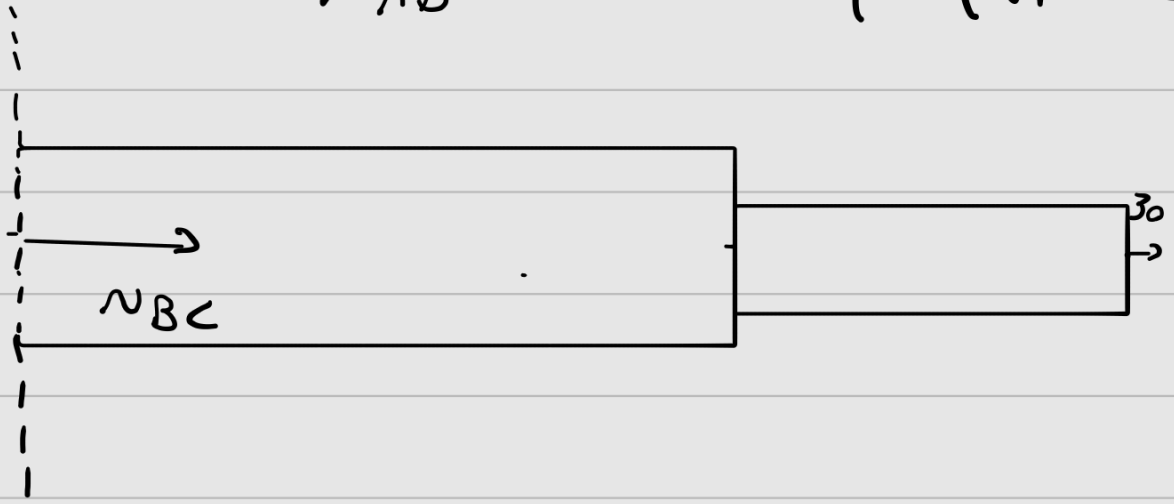
Find the internal forces P_1, P_2 and P_3 of the steel rod shown under the given loads. The rod is divided into three component parts.





$$-N_{AB} = 75 - 45 + 30 = 60 \text{ kips}$$

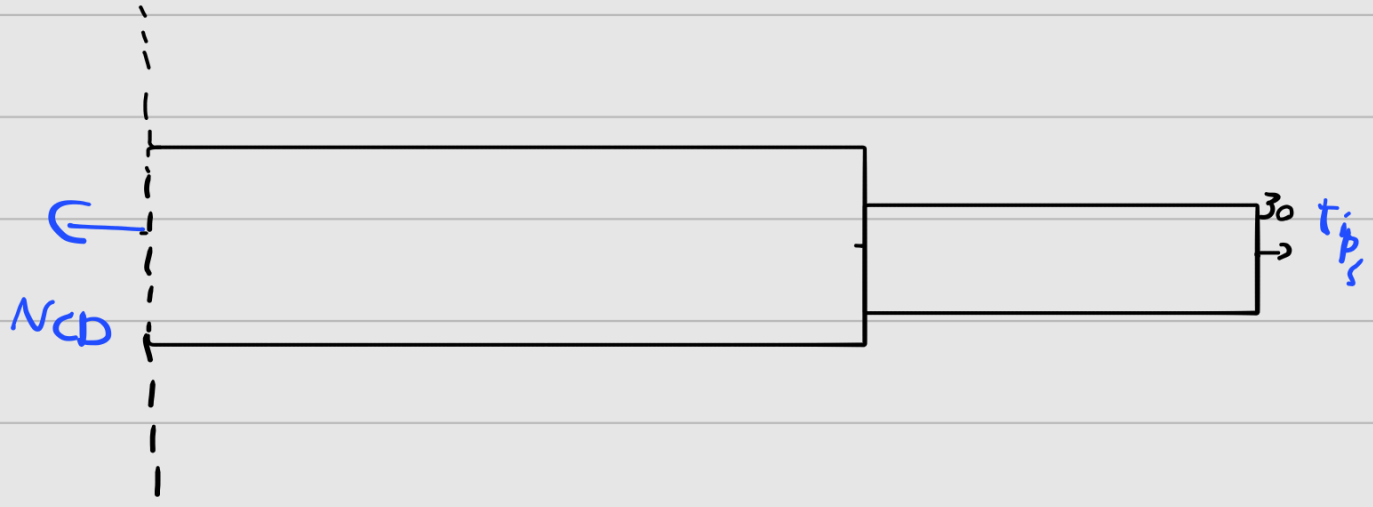
$$N_{AB} = -60 \text{ kips (traction)}$$



$N_{BC} - 45 + 30 = 0 \Rightarrow 15 \text{ kips} = N_{BC}$

(compression)

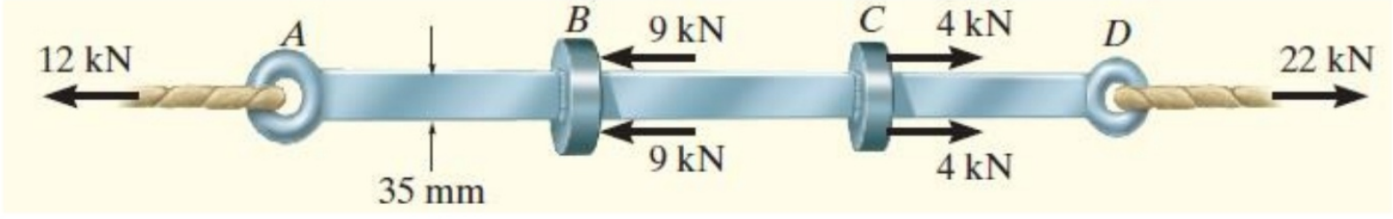
traction $\Rightarrow$ positive

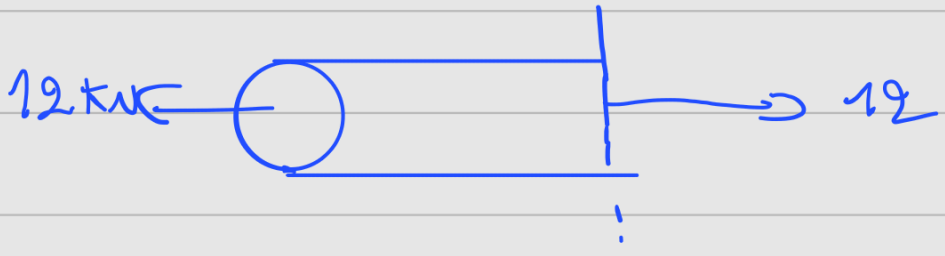


$N_{CD} = -30$ kips (traction)

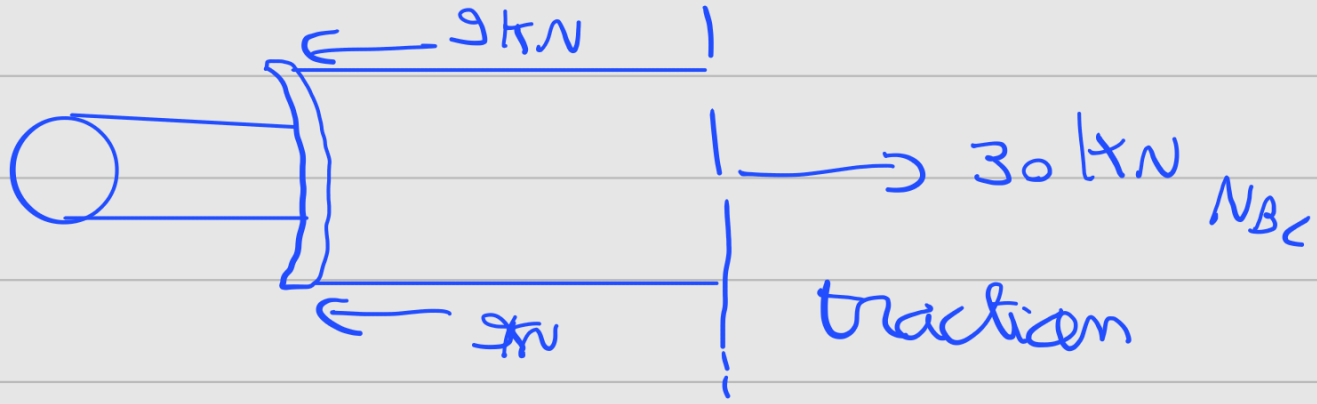
Problem 2 :

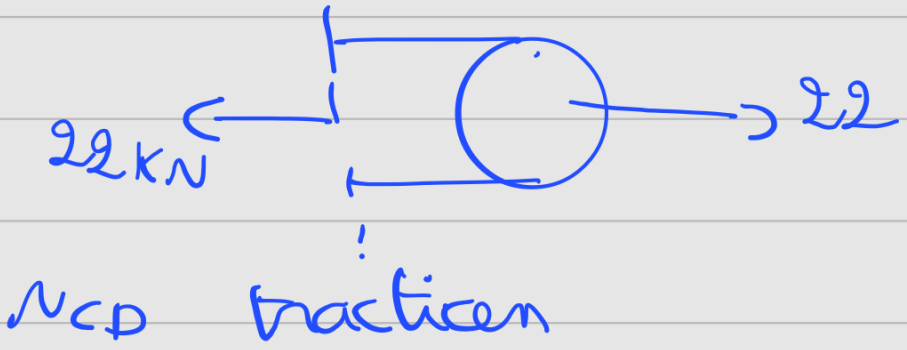
The bar in Figure below has a constant width of 35 mm and a thickness of 10 mm is subjected to the loading shown.
Draw the corresponding diagram of normal force and thus determine the location and the value of the maximum average normal stress in the bar.

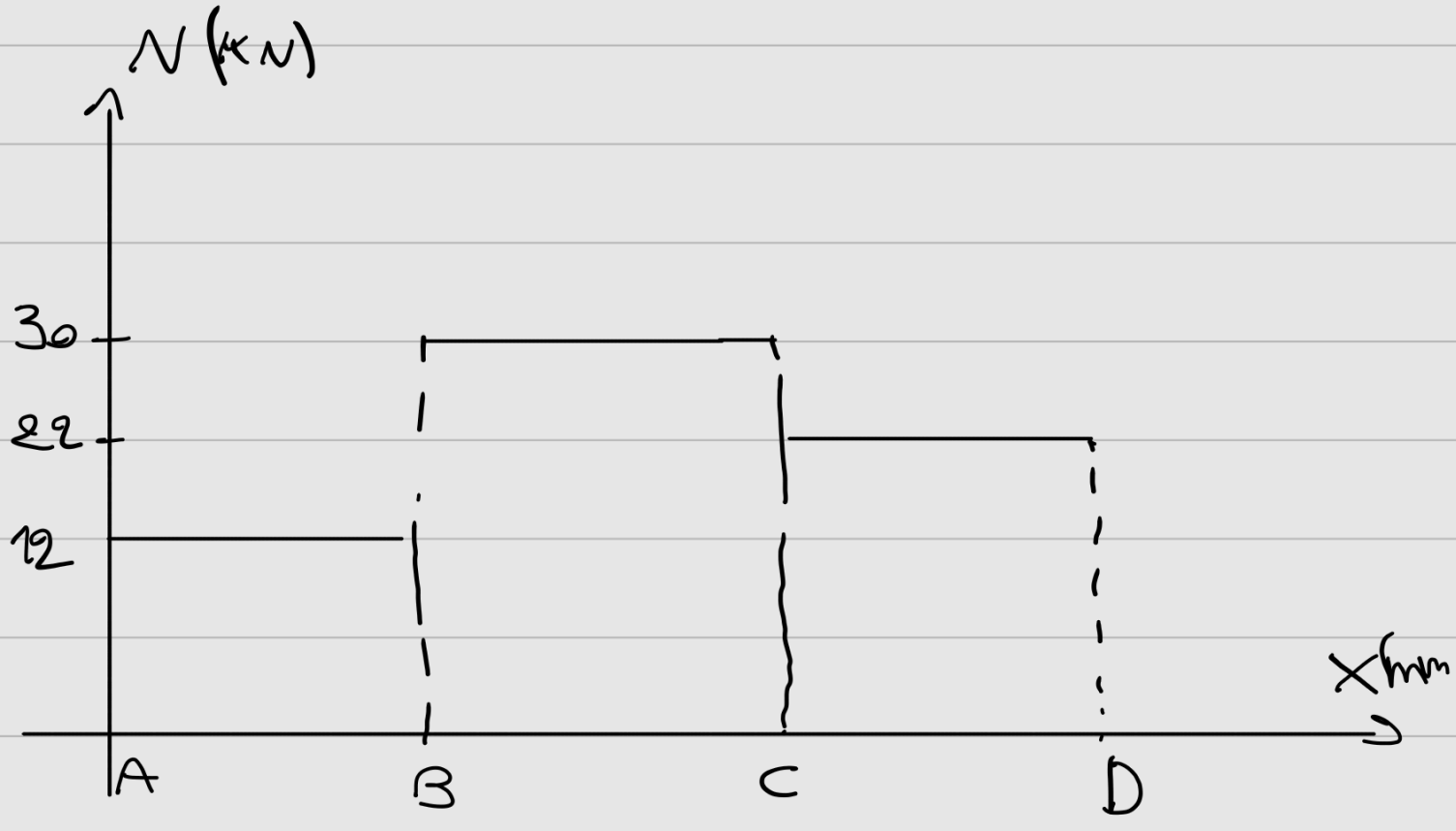




$N_{AB} = 12\ kN$ (traction)







$$\sigma = \frac{N}{A}$$

$$\sigma_{AB} = \frac{12 \cdot 10^3}{35.10 \cdot 10^{-6}} = 34285714,3 \ N/m^2$$

$$\sigma_{BC} = \frac{N_{BC}}{A} = \frac{30 \cdot 10^3}{35.10.10^{-6}}$$

$$= 857142857,71 \ N/m^2$$

$$\sigma_{CD} = \frac{N_{CD}}{A} = \frac{22 \cdot 10^3}{35.10.10^{-6}} =$$

$$628571428,86 \ N/m^2$$