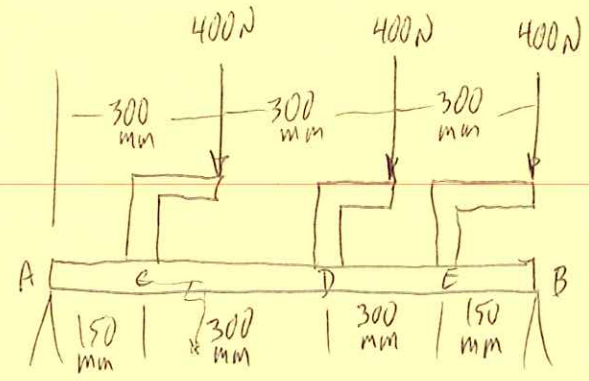
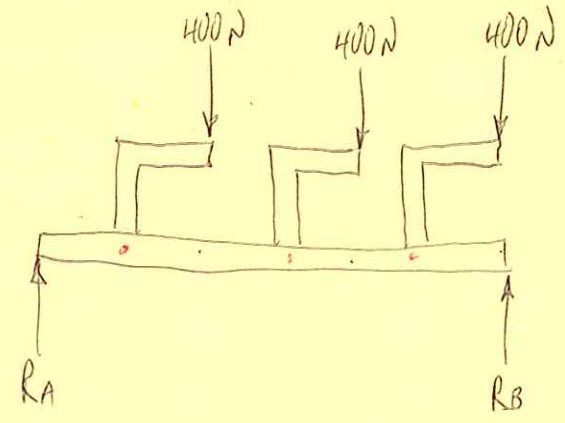


PROB. 7.52

DRAW SHEAR + BENDING MOMENT DIAGRAMS, FIND MAXIMUMS



FBD :

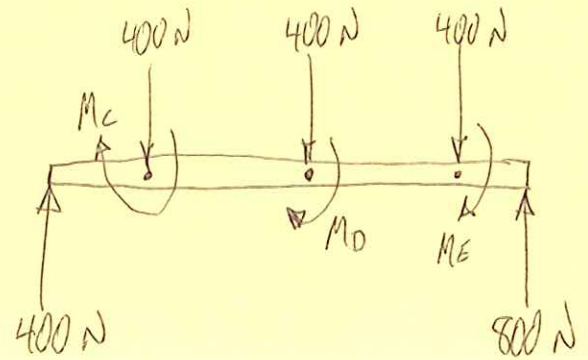


$$\sum M_A = 0 \quad +\curvearrowright : \quad 900 R_B - (300)(400) - (600)(400) - (900)(400) = 0$$

$$R_B = 800 \text{ N}$$

$$\sum F_y = 0 : \quad R_A + R_B = 1200 \quad R_A = 400 \text{ N}$$

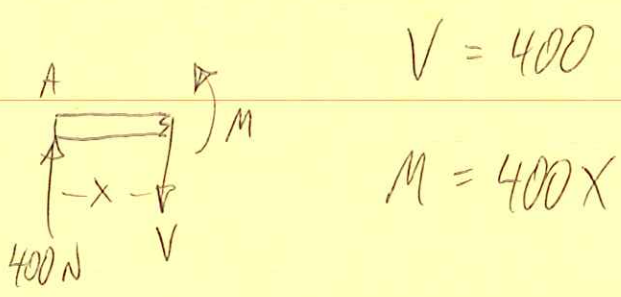
REPLACE 400 N LOADS WITH FORCE-COUPLE SYSTEMS



PROB. 7.52

$$M_c = M_D = M_E = (400\text{N})(150\text{mm}) = 6 \times 10^4 \text{ N}\cdot\text{mm}$$

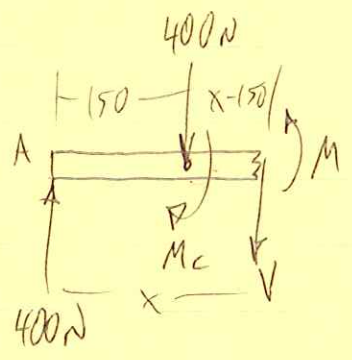
FBD BETWEEN A + C :



$$V = 400$$

$$M = 400x$$

FBD BETWEEN C + D :



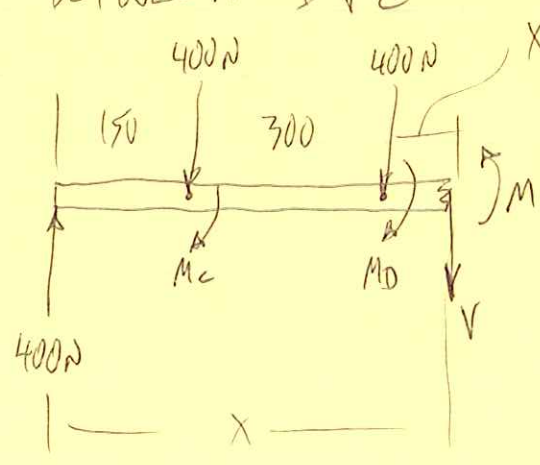
$$\sum F_y = 0 : 400 - 400 - V = 0$$

$$V = 0$$

$$\sum M = 0 \ (+) : M + 400(x-150) - 6 \times 10^4 - 400x = 0$$

$$M = 1.2 \times 10^5 \text{ N}\cdot\text{mm}$$

FBD BETWEEN D + E :



$$\sum F_y = 0 :$$

$$400 - 400 - 400 - V = 0$$

$$V = -400 \text{ N}$$

PROB. 7.52

10

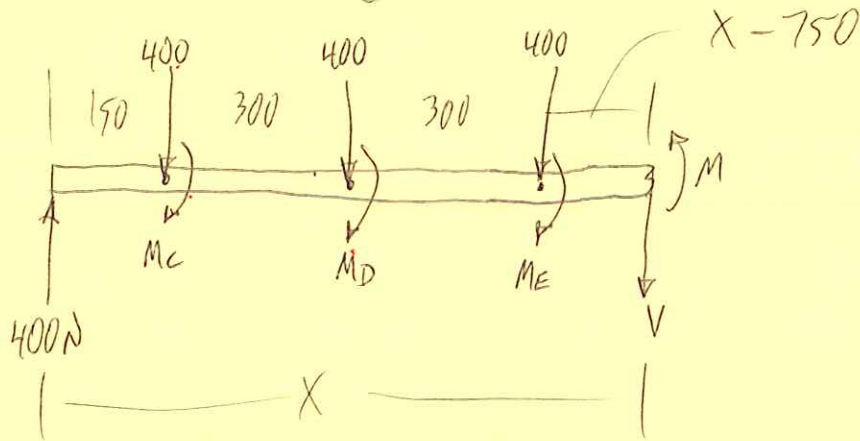
\*FBD BETWEEN C & B:

$$\sum M = 0 \quad (+\uparrow):$$

$$M + 400(x-450) - 6 \times 10^4 + 400(x-150) - 6 \times 10^4 - 400x = 0$$

$$M = -400x + 3.6 \times 10^5 \text{ N-mm}$$

FBD BETWEEN E & B:



$$\sum F_y = 0: 400 - 400 - 400 - 400 - V = 0, \quad V = -800 \text{ N}$$

$$\sum M = 0 \quad (+\uparrow): M + 400(x-750) - 6 \times 10^4 + 400(x-450) - 6 \times 10^4 + 400(x-150) - 6 \times 10^4 - 400x = 0$$

$$M = -800x + 7.2 \times 10^5 \text{ N-mm}$$

PROB. 7.52

~~At~~  $X = 0^+ : V = 400, M = 0$

$X = 150^- : V = 400N, M = 6 \times 10^4 N\text{-mm} = 60 N\text{-m}$

$X = 150^+ : V = 0, M = 1.2 \times 10^5 N\text{-mm} = 120 N\text{-m}$

$X = 450^- : V = 0, M = 120 N\text{-m}$

$X = 450^+ : V = -400N, M = 1.8 \times 10^5 N\text{-mm} = 180 N\text{-m}$

$X = 750^- : V = -400N, M = 60 N\text{-m}$

$X = 750^+ : V = -800N, M = 120 N\text{-m}$

$X = 900^- : V = -800N, M = 0$

