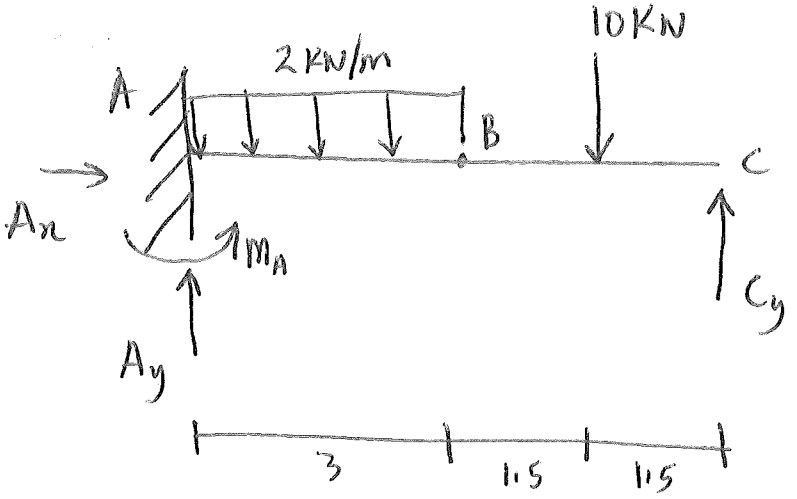
# Problem 7-20




$\sum M_B = 0$

$-10(1.5) + 3C_y = 0$

$C_y = 5\ KN$

$\sum F_x = 0$

$A_x = 0$

$\sum F_y = 0$

$2(3) + 10 = A_y + C_y$

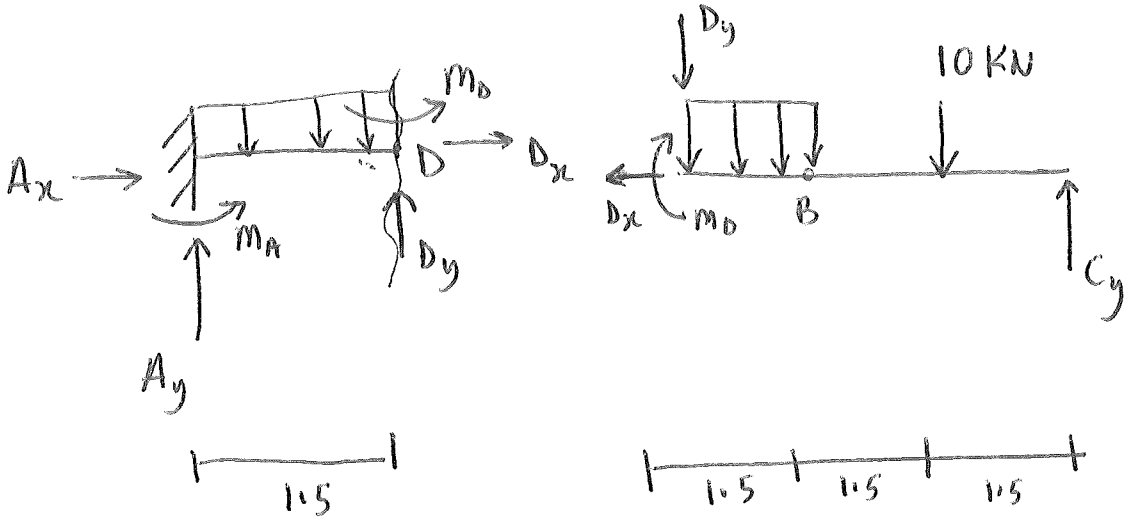
$A_y = 16 - 5 = 11\ KN$

$\sum M_A = 0$ (on the other side)

$-M_A + 2(3)(1.5) + 10(4.5) - 6C_y = 0$

$M_A = 9 + 45 - 6(5) = 24\ KNm$

Internal forces at D




Using Left Section

$\Sigma F_x = 0$

$D_x = 0$

$\Sigma F_y = 0$

$A_y + D_y = 2(1.5)$

$D_y = 3 - 11 = -8$ KN

(Shear Force)

$\Sigma M_D = 0$

$M_D + 2(1.5)\frac{1.5}{2} - 11(1.5) + 24 = 0$

$M_D = -9.75$ KNm

(bending moment)

using Right Section

$\Sigma F_y = 0$

$C_y = D_y + 2(1.5) + 10$

$D_y = 5 - 3 - 10 = -8$ KN

$\Sigma M_D = 0$

$-M_D - 2(1.5)\frac{1.5}{2} - 10(3) + 4.5C_y = 0$

$M_D = -2.25 - 30 + 4.5(5)$

$= -9.75$ KNm

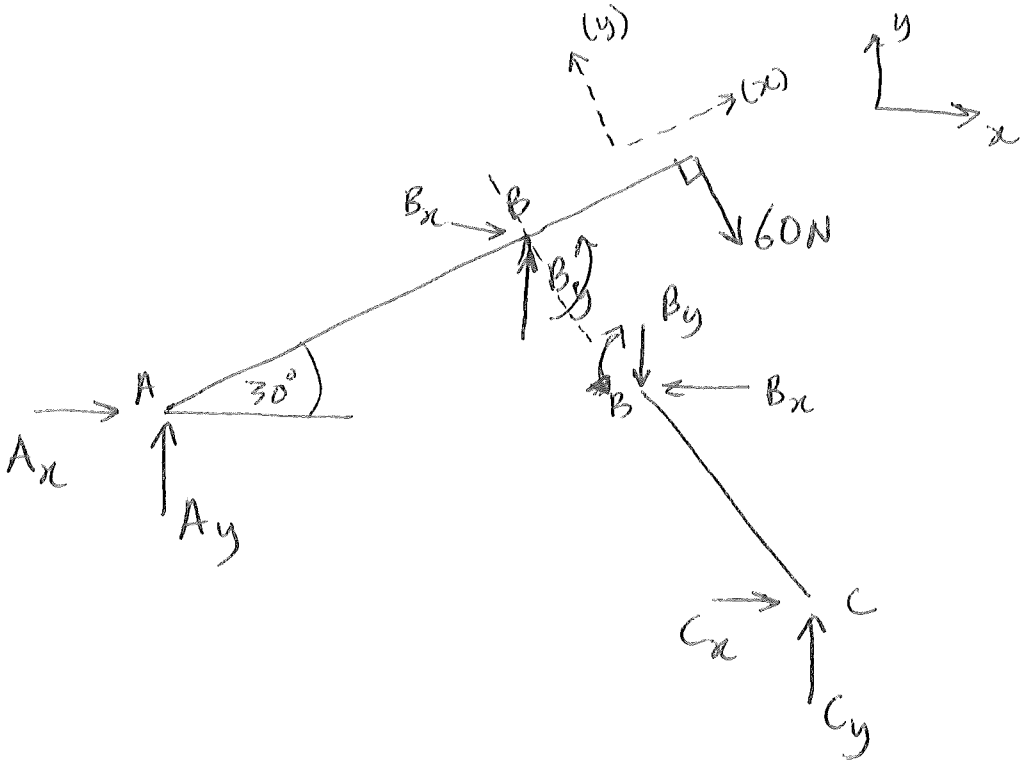
(bending moment)

Students: Repeat process for points E.

So as we have illustrated, shear force at a point is the sum of vertical forces to the left ~~from~~ of the point from the support, or sum of forces ~~from~~ to the right from the support. Likewise bending moment.

Note that we could have started from the section(s) and calculated the reactions as and when needed or encountered.

# 7-23




$\sum M_A$

$$B_y \cos 30 (2\cos 30) - 60(2\cos 30 + 0.75) = 0$$

$$B_y = 99.28\ N$$

$$B_{y(x)} = 99.28 \cos 30 = 85.98\ N$$

$\sum F_y = 0$

$$A_y \cos 30 + B_y \cos 30 = 60 \cos 30$$

$$A_y = 60/\cos 30 - B_y = 60/\cos 30 - 99.28$$

$$= -29.99\ N$$