

The free body diagram (FBD) for beam $A-B$ is shown to the right. In the FBD, the force couple has been replaced by its equivalent moment.

The support reactions at A can then be obtained by applying the equations of equilibrium.

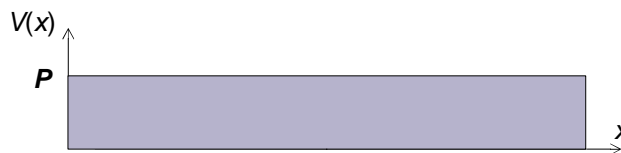
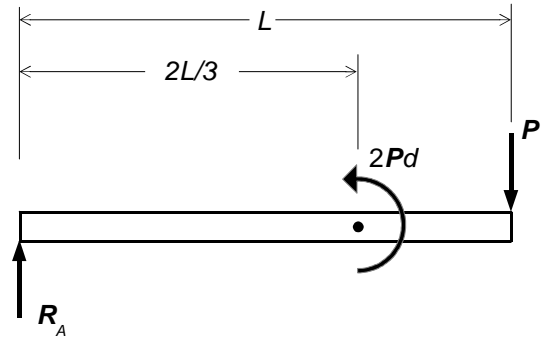
For vertical force equilibrium:

$$\sum F_y = 0 \Rightarrow R_A = P$$

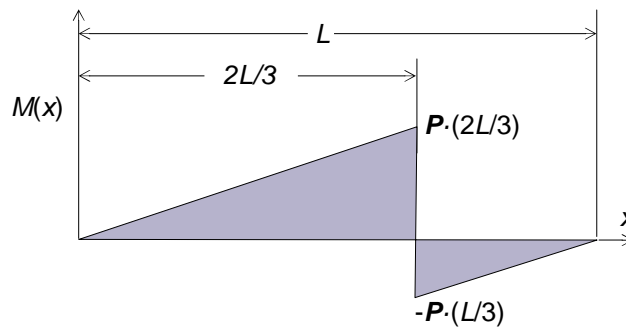
and for moment equilibrium:

$$\sum M_A = 0 \Rightarrow -2Pd + PL = 0 \Rightarrow d = L/2.$$

In other words, post $C-D$ must be half as long as beam $A-B$ for there to be static equilibrium. At this point we can draw the shear force diagram, using the graphical method:



And now the moment diagram:



So, the maximum bending moment is $M_{\max} = P \cdot (2L/3)$. The correct answer is (B).

