(I) $\begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ \frac{a}{2}\sin(50°) & -\frac{a}{2}\cos(50°) & -\frac{b}{2} \\ 0 & -W & 0 \end{vmatrix} = -\frac{Wb}{2}\hat{\imath} + 0\hat{\jmath} - \frac{aW\sin(50°)}{2}\hat{k} = \vec{M}_I$

(II) $\begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ 0 & 0 & -b \\ B_x & B_y & 0 \end{vmatrix} = bB_y\hat{\imath} - bB_x\hat{\jmath} + 0\hat{k} = \vec{M}_{II}$

(III) moment is ZERO about A as $\vec{r} = \vec{0} \Rightarrow \vec{M}_{III} = \vec{0}$

(IV) $\vec{M}_{IV} = \frac{\|\vec{F}_{CD}\|}{\|\vec{CD}\|}\begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ a\sin(50°) & -a\cos(50°) & 0 \\ a\sin(50°) & a(1-\cos(50°)) & b/4 \end{vmatrix} = \frac{\|\vec{F}_{CD}\|}{\|\vec{CD}\|}\left(-\frac{ab\cos(50°)}{4}\hat{\imath} - \frac{ab\sin(50°)}{4}\hat{\jmath} + \hat{k}\left(a^2\sin(50°)(1-\cos(50°)) + a^2\sin(50°)\cos(50°)\right)\right)$

Each component M_x, M_y, M_z must be zero

$\Sigma M_z = 0 \Rightarrow \frac{\|\vec{F}_{CD}\|}{\|\vec{CD}\|}\left(a^2\sin(50°)(1-\cos(50°)) + a^2(\sin 50°)(\cos 50°)\right) - \frac{aW\sin 50°}{2} = 0$ cancel 'a' out & cancel $\sin(50°)$

$\Rightarrow \frac{\|\vec{F}_{CD}\|}{\|\vec{CD}\|}\left(a - \cancel{a\cos(50°)} + \cancel{a\cos(50°)}\right) = +\frac{W}{2} \Rightarrow \boxed{\|F_{CD}\| = \frac{W}{2a}\|\vec{CD}\|}$

$\Sigma M_y = 0 \Rightarrow -bB_x - \frac{ab\sin(50°)}{4}\frac{\|F_{CD}\|}{\|\vec{CD}\|} = 0$, & since $\frac{\|F_{CD}\|}{\|\vec{CD}\|} = \frac{W}{2a}$ we have

$\boxed{B_x = -\frac{W\sin(50°)}{8}}$

$\Sigma M_x = 0 \Rightarrow -\frac{W\cancel{b}}{2} + \cancel{b}B_y - \frac{\|\vec{F}_{CD}\|}{\|\vec{CD}\|}\left(\frac{a\cancel{b}\cos(50°)}{4}\right) = 0$ cancel "b"; Substitute $\frac{\|F_{CD}\|}{\|\vec{CD}\|} = \frac{W}{2a}$

$\Rightarrow B_y = \frac{W}{2} + \frac{W}{2a}\left(\frac{a\cos 50°}{4}\right) = \boxed{\frac{W}{2}\left(1 + \frac{\cos(50°)}{4}\right)}$

Still need to get A_x, A_y, A_z ... but still have 3 equilib eqns left...

$\Sigma F_x = 0 \Rightarrow A_x + B_x + F_{CD_x} = 0 \Rightarrow A_x = -\left(-\frac{W\sin(50°)}{8}\right) - \frac{\|F_{CD}\|}{\|\vec{CD}\|}(a\sin 50°)$

& since $\frac{\|F_{CD}\|}{\|\vec{CD}\|} = \frac{W}{2a}$ ... $A_x = \frac{W\sin 50°}{8} - \frac{W\cancel{a}}{2\cancel{a}}\sin(50°) = \boxed{-\frac{3}{8}W\sin(50°)}$

$\Sigma F_y = 0 \Rightarrow A_y + B_y + F_{CD_y} - W = 0$ or $A_y = -B_y - F_{CD_y} + W$

$A_y = -\frac{W}{2}\left(1 + \frac{\cos 50°}{4}\right) - \left(\frac{W}{2a}\right)\left(a(1-\cos(50°))\right) + W$

simplifies to $\boxed{A_y = +\frac{3}{8}W\cos(50°)}$

$\Sigma F_z = 0$ $A_z + F_{CD_z} = 0$ $A_z = -F_{CD_z} = \left(-\frac{W}{2a}\right)\left(\frac{b}{4}\right) = \boxed{\frac{Wb}{8a}}$