B/38 Axis 1-1; Shell; $I_{1-1} = mr^2 = \rho\, 2\pi r\ell\,(r^2) = 2\pi\rho r^3\ell$

where ρ = mass/unit area

Panels: $I_{1-1} = 2\left\{\frac{1}{12}m(2r)^2 + m(2r)^2\right\}$

$= 8\rho(2r\ell)\left\{\frac{r^2}{12} + r^2\right\} = \frac{52}{3}\rho r^3\ell$

Total $I_{1-1} = \rho r^3\ell(2\pi + 52/3) = 23.62\,\rho r^3\ell$

Axis 2-2; Shell; $I_{2-2} = \frac{1}{2}m\left(r^2 + \frac{1}{6}\ell^2\right) = \frac{1}{2}\rho(2\pi r\ell)\left(r^2 + \ell^2/6\right)$

Panels; $I_{2-2} = 2\left\{\frac{1}{12}m\ell^2\right\} = \frac{1}{6}\rho(2r\ell)\ell^2 = \frac{1}{3}\rho r\ell^3$

Total $I_{2-2} = \rho r\ell\left(\pi\left[r^2 + \ell^2/6\right] + \frac{1}{3}\ell^2\right) = \rho r\ell\left(\ell^2\left[\frac{\pi}{6} + \frac{1}{3}\right] + \pi r^2\right)$

For critical condition $I_{1-1} = I_{2-2}$

So $23.62\,\rho r^3\ell = \rho r\ell(0.857\ell^2 + \pi r^2)$

$0.857\ell^2 = (23.62 - \pi)r^2$

$\ell^2 = 23.89\,r^2$, $\ell = 4.89r$

$I_{1-1} < I_{2-2}$ if $\underline{\ell > 4.89r}$