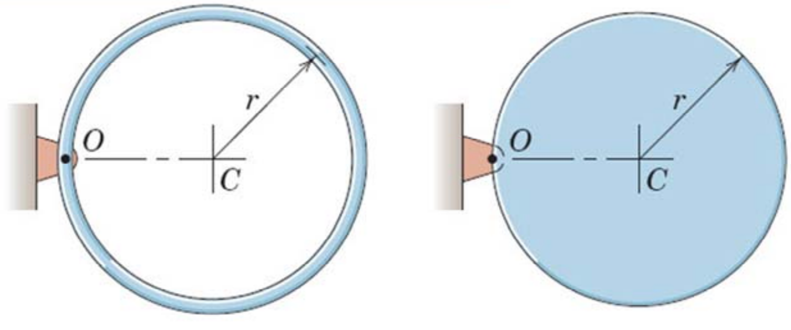
Fixed-Axis Rotation: Exercise



(a) (b)

Determine the ***angular acceleration*** and the ***force*** on the ***bearing*** at ***O*** for (a) the narrow ***ring*** of ***mass m*** and (b) the flat circular ***disk*** of ***mass m*** immediately after each is released from rest with ***OC*** horizontal.

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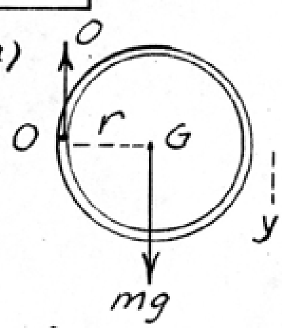
(a)



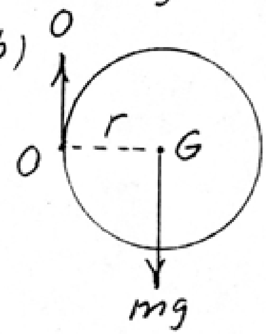
$\Sigma M_O = I_O \alpha; \quad mgr = 2mr^2\alpha$

$\underline{\alpha = g/2r}$

$\Sigma F_y = m\bar{a}_y; \quad mg - O = mr\left(\frac{g}{2r}\right)$

$\underline{O = mg/2}$

(b)



$\Sigma M_O = I_O \alpha; \quad mgr = \left(\frac{1}{2}mr^2 + mr^2\right)\alpha$

$\underline{\alpha = 2g/3r}$

$\Sigma F_y = m\bar{a}_y; \quad mg - O = mr\left(\frac{2g}{3r}\right)$

$\underline{O = mg/3}$