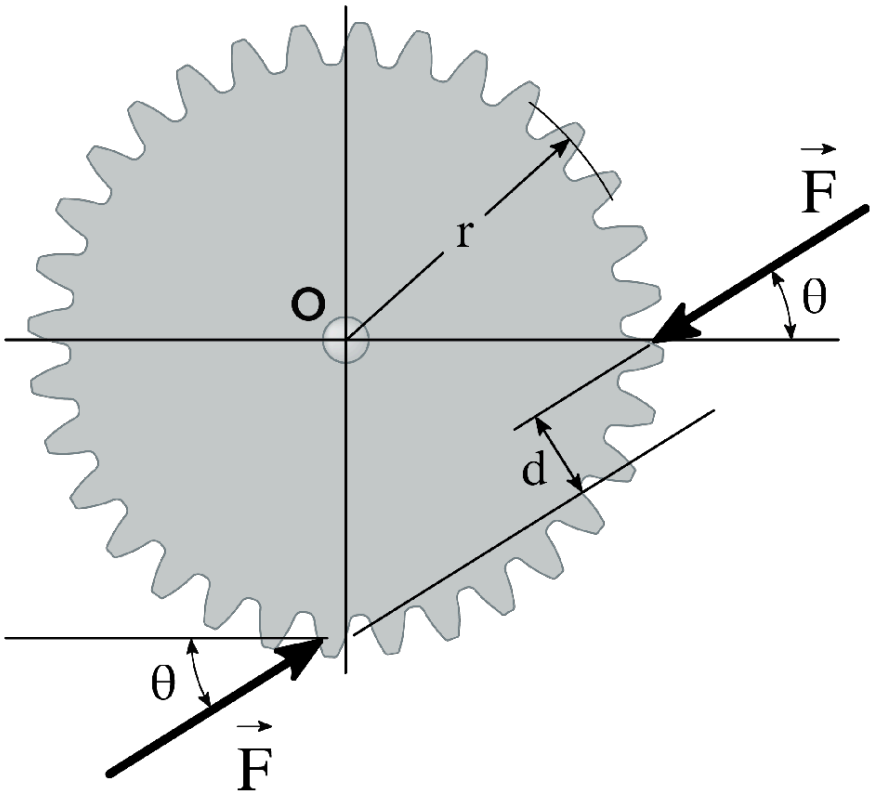

Two forces with equal magnitude of F act on a gear in opposite directions. If the gear has radius r, find the magnitude of the resultant moment experienced by the gear and the perpendicular distance between the forces, d.

Assuming counterclockwise rotation is positive:

$M_R = r \cdot F \cos\theta - r \cdot F \sin\theta$

$\Rightarrow M_R = r \cdot F(\cos\theta - \sin\theta)$

Assuming $0^\circ < \theta < 45^\circ$

Since $M = Fd$, $d = r \cdot (\cos\theta - \sin\theta)$