4-59 solution

Given:

$F = 30$ N

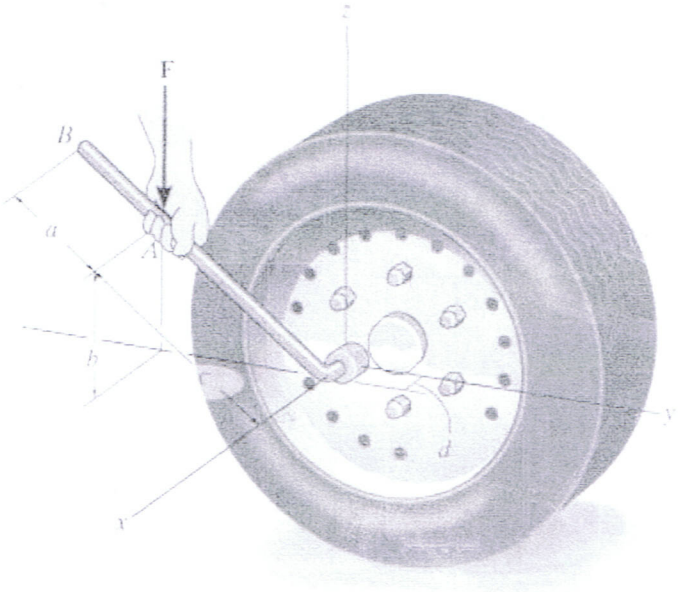
$M = 14$ N·m

$a = 0.25$ m

$b = 0.3$ m

$c = 0.5$ m

$d = 0.1$ m



Solution:

$$M_x = F\sqrt{c^2 - b^2}$$

$M_x = 12$ N·m

$M_x < M$ No

For M_{xmax}, apply force perpendicular to the handle and the x-axis.

$M_{xmax} = F\,c$

$M_{xmax} = 15$ N·m

$M_{xmax} > M$ Yes

$M_x = F \cdot d$ perpendicular distance $d = \sqrt{0.5^2 - 0.3^2} = 0.4$ m

$M_x = 30 \times 0.4 = 12$ N.m

This moment is smaller than 14 N.m → answer = No

When force is applied perpendicular to the handle:

$M_{x(max)} = F \cdot d_{max} = 30 \times 0.5 = 15$ Nm > 14 Nm Yes

So you can not change the position of the force but the angle it makes with the handle.