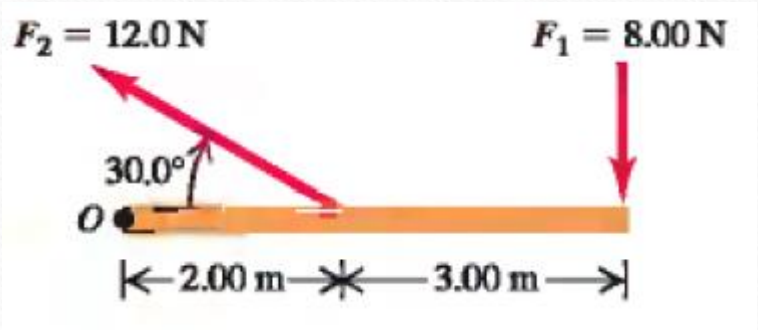
CSD2301 Practice
13. **Rotational Dynamics**

LIN QINJIE

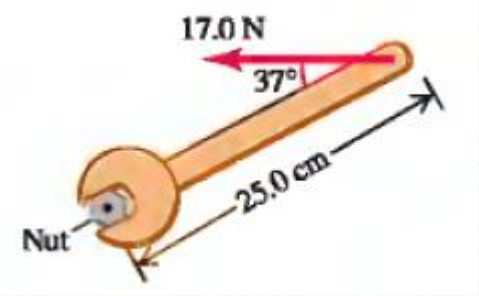
Practice Question 1

Calculate the net torque about point O for the two forces applied as in the figure shown. The rod and both forces are in the plane of the page.



Practice Question 2

A machinist is using a wrench to loosen a nut. The wrench is 25.0 cm long, and he exerts a 17.0 N force at the end of the handle at 37° with the handle as shown in the figure. (a) What torque does the machinist exert about the center of the nut? (b) What is the maximum torque he could exert with this force, and how should the force be oriented?

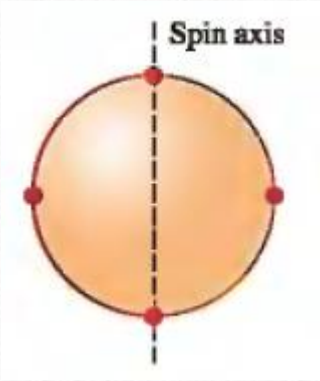


Practice Question 3

The flywheel of an engine has moment of inertia 2.50 kgm^2 about its rotation axis. What constant torque is required to bring it up to an angular speed of 400 rev/min in 8.00 s, starting from rest?

Practice Question 4

A uniform, 8.40 kg, spherical shell 50.0 cm in diameter has four small 2.00 kg masses attached to its outer surface and equally spaced around it. This combination is spinning about an axis running through the center of the sphere and two of the small masses. What friction torque is needed to reduce its angular speed from 75.0 rpm to 50.0 rpm in 30.0 s?



Practice Question 5

An electric motor consumes 9.00 kJ of electrical energy in 1.00 min. If one-third of this energy goes into heat and other forms of internal energy of the motor, with the rest going to the motor output, how much torque will this engine develop if you run it at 2500 rpm?

Practice Question 6

A 1.50 kg grinding wheel is in the form of a solid cylinder of radius 0.100 m. (a) What constant torque will bring it from rest to an angular speed of 1200 rev/min in 2.5 s? (b) Through what angle has it turned during that time? (c) Calculate the work done by the torque. (d) What is the wheel's kinetic energy when it is rotating at 1200 rev/min? Compare your answer to the result in part (c).