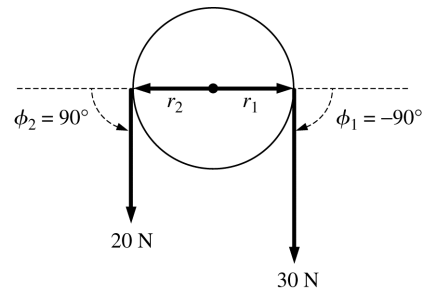


13.11. Visualize:



Solve: Torque by a force is defined as $\tau = Fr\sin\phi$ where ϕ is measured counterclockwise from the \vec{r} vector to the \vec{F} vector. The net torque on the pulley about the axle is the torque due to the 30 N force plus the torque due to the 20 N force:

$$\begin{aligned}(30 \text{ N})r_1 \sin\phi_1 + (20 \text{ N})r_2 \sin\phi_2 &= (30 \text{ N})(0.02 \text{ m}) \sin(-90^\circ) + (20 \text{ N})(0.02 \text{ m}) \sin(90^\circ) \\ &= (-0.60 \text{ N m}) + (0.40 \text{ N m}) = -0.20 \text{ N m}\end{aligned}$$

Assess: A negative torque causes a clockwise motion of the pulley.