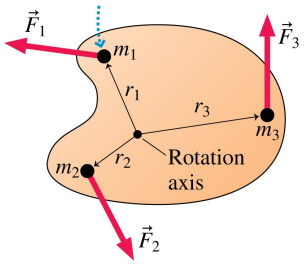
Rotational Dynamics:

In the same way that a net force produces an acceleration:

$$\sum \vec{F} = m\vec{a}$$



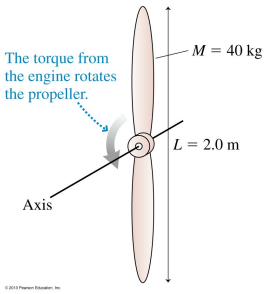
The net torque produces an angular acceleration:

$$\sum \vec{\tau} = I\vec{\alpha}$$

where I is the moment of inertia. It depends not just on the mass, but how the mass is distributed relative to the the axis of rotation.

Example:

The engine in a small airplane is specified to have a torque of 60 Nm. The engine drives a 2.0 m long, 40 kg propeller. On startup, how long does it take the propeller to reach 20.9 rad/s.



The moment of inertia is given by: $I = \frac{1}{12}ML^2$