

We recently introduced a vector quantity called torque-- a sort of rotational analog to force.

And we saw that an applied torque changes the angular motion of a rotating body in just the same way that an applied force changes the linear motion of a translating body.

This week, we're going to introduce the concept of angular momentum, which relates to torque and rotational motion in the same way that ordinary momentum relates to force and translation of motion.

Like torque, angular momentum is defined in terms of a cross product or a vector product.

Specifically, the angular momentum vector L for a point mass is equal to the cross product R cross P , where R is the position vector measured from a chosen reference point and P is the ordinary momentum vector.

We will also encounter a third conservation principle, this time for angular momentum.

An applied torque causes the angle the moment of to change.

However, if there are no external torques on a system, then the angular momentum of the system is conserved or remains constant.

This is a powerful tool for solving many problems.

One subtlety is that angular momentum like torque is defined relative to a specified point.

So for a given system, the angular momentum with respect to one point might be conserved, while the angular momentum with respect to a different point might be changing.

Often in analyzing the system, we must be careful about our choice of reference point for torques and angular momentum in order to take full advantage of the conservation principle.

Angular momentum is a particularly subtle and non-intuitive concept in comparison to momentum and energy.

And the resulting motion is often surprising.

It is worthy of particularly careful study.