Let's consider the motion of a symmetric object that's rotating about a fixed axis.

So we could take some object.

And we can imagine this is sort of what sometimes people refer to as a spinning top.

And it's rotating about this symmetry axis, k.

And we know that the angular velocity of the object we can write as omega z k hat.

And the angular momentum about this symmetry axis we just showed that was equal to the moment of inertia about this axis times the angular velocity.

And in particular, the magnitude of the angular momentum-- I'll just write that L about that axis is i axis times the magnitude of the angular velocity.

Now, we've seen separately that the kinetic energy about this axis, which we'll call the rotational kinetic energy, was 1/2 times the moment of inertia about that axis times the angular velocity squared.

But here, we see that omega squared is equal to L over i.

So if we substitute that in, we get L squared about that axis over i axis squared.

And so we have a nice expression for the kinetic rotational kinetic energy is L squared about that axis over 2 moment of inertia about that axis.

And this we can describe is the kinetic energy of a symmetric body about a fixed axis.

It is nice to notice the angular-- the linear analogy to this, when we wrote that the momentum of an object was mv, so the magnitude of the momentum is just m times v.

And when we write kinetic energy translation as 1/2 and v squared, we can write that as a translational kinetic energy as p squared over 2m.

So once again, we see this nice analogy for rotational motion where we describe it in terms of the angular momentum and the moment of inertia.

And linear motion, we describe in terms of momentum and the mass.