Let's consider a wheel that's rolling.

So our wheel is rolling along a surface.

The wheel has radius r.

And I want to consider the motion of a point P on the rim of the wheel.

Now, I'll choose an origin that's fixed.

And in fact, here we're going to talk about the reference frame A, which is fixed to the ground.

And I would like to consider-- my problem is to find both the position of the point on the rim, the velocity of the point on the rim, and the acceleration of the point in the rim as a function of time.

Now, the position vector is given from my fixed origin to where the point on the rim is.

Now, this can be quite complicated.

But what we're going to do is consider a second reference frame that is located at the center of mass of the wheel.

So our second frame, we'll take reference frame and we'll call this frame cm, is located, is moving with the center of mass of the wheel.

So in that reference frame, we'll denote this point by vector r cm, because we're in the reference frame with respect to the center of mass, and we're talking about the point P.

Now, these vectors are connected.

And we'll call this vector capital R. By our vector triangle, capital R equals little rP-- that's the position vector.

And the fixed frame of the ground is given by capital R plus r cm P.

Now, as we've seen before by differentiating, the velocity of the particle is given by V plus V cm P. This one is the velocity in frame fixed to the ground.

This is the velocity of the center of mass with respect to ground frame.

And finally, V cm P is the velocity in the center of mass frame.

Now, in order to analyze this law, what we'll now do is focus on what the motion looks like if you're an observer moving with the center of mass.

And that's how we'll begin our analysis.