And now I'm in position to talk about what is the maximum force.

If I push F harder, as if I push F and the blocks go together, the accelerations are the same.

I push F harder.

Accelerations are the same.

I push F harder, and I push F so hard, that the static friction no longer reaches its maximum value.

And if I push F harder than that, I will not have-- the static friction can't get bigger, and the blocks 1 and 2 will start to slip relative to each other.

So my no slipping condition is that I want two things.

a1 equals a2.

We'll call that a.

And the maximum force condition is that F static is equal to maximum value.

Now, what is the normal force between that we refer to in our fiction law?

There's two normal forces-- the ground and the normal force between the surfaces.

But the static friction that we're talking about is between the surfaces.

So that's why we use N here and not N ground.

And now I can solve for this F max.

By the way, we also have the condition that fk is mu k.

What normal force are we talking about?

N, which we've called N ground 1.

And now I look at my equations, and my goal is to solve for F. I know Ng1 from this equation.

It's just equal to M1g plus N. I Know N from that equation.

So Ng1 is just the sum of the masses times g.

So I know this.

I have f, which is m2a.

And I can now apply my result.

So what we'll do is we'll solve for the a's, a1 equals a2, in terms of F max.

So over here we have that a is f over m2.

That's from this equation.

And now I'll substitute a1 is equal to that.

I'll substitute that there.

And I get that F Max is going to be equal to fk plus f static max.

That's that one.

Plus m1 times a1, which is f static max divided by m2.

And so I get that F max equals-- now I'm going to substitute in all of these values.

It's going to look a little complicated.

And so I'd like to have a little space here for that, to get everything in here.

And we'll see that it's equal to mu k m1 plus m2g, fk, mu k, plus m1 2mg plus f static max times 1 plus and m1 over m2.

But f static max is mu N, and N is m2g.

So I get m2g times 1 plus m1 over m2.

And there is, if I push any harder than that, block 2 will slip with respect to block 1.

Again, all of our terms have the dimensions of acceleration.

This is dimensionless-- 1, dimensions of acceleration.

And we did miss one little thing.

We missed the coefficient of static friction.

And there we have it, a tricky problem.