We are now in position to find the accelerations a_1, a_2, and the tension, because we have Newton's second law and our constraint condition for the acceleration.

Let's recall the equations that we found.

We had $m_1 g$ minus t was $m_1 a_1$.

And we had $m_2 g$ minus $2t$ was equal to $m_2 a_2$.

And we also had the condition-- constraint condition between the accelerations that a_1 was minus $2a_2$.

So now we have a system of three equations.

And we can find-- we can solve for any of these quantities that we want.

So one way to do it is to identify an equation and to identify a quantity that we would like to solve for.

So for instance, let's identify that we want to solve for a_1 first.

So how are we going to develop a strategy for that?

Well, I'll choose equation 1 as my backbone equation.

And I have an unknown t.

But in equation 2, that unknown t is appearing there, but it's expressed in terms of a_2.

And a_2, though, from equation 3 is expressed in terms of a_1.

So my first step is to write equation-- rewrite equation 2 as $m_2 g$ minus $2t$ equals m_2.

Now here I'm going to make the substitution, which is minus a_1 over 2, so we'll call that 2a.

And now I have equation 1 and equation 2a, two unknowns t, and a_1.

And what I can do is I can solve for either equation.

And I can make a choice what's easiest.

When I look at these equations, it's easiest for me to identify what t is in terms of a_1.

So I'll write $m_1 g$ minus $m_1 a_1$ is equal to t.

I'll call that equation 1a.

And now I can substitute that value of t into equation 2a.

And I get m_2g minus 2 times m_1g minus m_1a_1.

And that's equal to minus m_2 over 2 times a_1.

And now I'd like to collect my a_1 terms.

And what I have over here-- let's bring all the a_1 terms to this side.

And I get m_2g minus $2m_1g$.

I have a plus, so I'm going to bring that over to this side.

And I get equal to-- that's plus plus, so I'll have two minus signs, and I'll have $2m_1$ plus m_2 over 2 a_1.

And now I can solve for a_1.

And what I get is I get $2m_1g$ minus m_2g.

And I want to divide through by this denominator.

And what I have downstairs is $2m_1$ plus m_2 divided by 2.

And that's my expression for a_1.

Once I have that expression for a_1, I can easily come back and find out what a_2 is.

Or I can substitute it into the equation here for a_1 and find out what the tension is.

And so I can now easily find my expressions for a_2 and t.

But I'll leave that as an exercise.