PROFESSOR: So here is the problem: I throw up an object vertically with a velocity of 10 meters per second. Let us assume throughout the whole problem that it's just easier that g, which is in down direction, equals 10 meters per second squared.

So I throw up number 1, object number 1, at t equals 0 at 10 meters per second, and then I throw up another object number 2, when t equals 1 second, so I throw it up 1 second later, and I do that at 6 meters per second. And now the question is do they hit? Where do they hit? And you can even ask the question, with what speed do they hit? Is one perhaps going up? Is the other perhaps going down?

All right, let us write down the equations of the position for object number 1.

For object number 1, I know that y as a function of t equals v0 for object number y times t minus 5t squared. I call the equation number 1. This is for object number 1. For object number 2, I have y t prime equals vo2 times t prime minus 5 t prime squared. The prime indicates that it is one second later than t. It's not the same time, and the 2 refers to object number 2 and the 1 refers to object number 1.

These objects will be at the same position when the height above the ground is the same. Of course, it may never happen. There may not even be a solution.

Now comes the key thing that you have to recognize. You have to substitute in this equation number 2 that t prime equals t minus 1. And notice, when t in this equation is 1, 1 minus 1 is 0. The t prime is 0. And that's exactly what you want because when this object has already moved 1 second, this object starts at that moment. So the t prime is t minus 1. Once you recognize that, you're well on your way. Because now I work out this object number 1 so I get 10 times t minus 5 t squared. That's object number 1. Equals 6 times t minus 1, which is for object number 2, Minus 5 times t minus 1 squared.

So I get 10t minus 5t squared equals 6t minus 6 minus 5t squared plus 10t minus 5. And what do I see? This cancels. This cancels. And I find that this will occur when t equals 11/5 seconds.

I can now ask myself the question, where are these objects at t 11/5 seconds? Oh, it's 11/6. Yeah, 11/6.

So now I go to equation number 1. I substitute in equation number 1, t equals 11/6 seconds. I go to the equation number 2, and I substitute in equation number 2, t prime equals 11/6 minus 1. So that means that it's 5/6 seconds and I should find that, indeed, the two objects are at the same position, y.

I now want you to do a little bit more work. I want you to tell me whether object number 1 is on the way up or whether it's on the way down. I can already assure you that number 1 is on the way down. Because I know I did it in my heart that it takes 1 second for object number 1 to reach its maximum height. So it must be on the way down if it collides 11/6 seconds later. But maybe object number 2 is maybe on the way up or maybe on the way down. I leave you with that. I'm now going to watch the tape. There are always some slips of the tongue. Not always, but almost always, and I will correct them.