THE WAVE RIDER mini-lab

The Wave Ride video can be found by going to MyPoly, clicking on the TOPICS folder, then opening the *""How To" video URLs"* folder. Inside that folder you will find two links. Clicking on the "Wave Impulse video" file will open the video you want (I can't give you a direct URL link because the video is behind Poly's firewall).

The video will show a Magic Mountain-like water ride in which a carriage full of people experience an extended, splashing crash through a huge pool of water the interaction of which changes the carriage's motion considerably. Your thrill will be to use the impulse relationship to determine how large a force, on average, the water exerts on the carriage through this interaction.

When you watch the video, you will notice several add-ons not expected to be present in a normal video.

1.) There is a large window toward the top that acts like a counter from which you can make timing measurements (record the frame number at the beginning of an interval; record the frame number at the end of the interval; dividing the difference in the frame rates by the *frames per second* value provided and you'll have the time in seconds of the interval).

2.) Right at the beginning of the run, before the carriage hits the water, a 1-meter length will show itself. Using your ability to measure time (see #1 above), you should be able to determine the velocity of the carriage at that point in time. A similar 1-meter length will show itself at the end of the run.

3.) And you'll need to know the mass of the carriage experiencing the acceleration. Approximations will have to do here. I'd assume each occupant had a mass of 80 kg, and we might assume the carriage could have a mass around 1000 kg. You should be able to determine the total mass from that (you'll obviously have to count the number of people in the carriage to do this).

In any case, your assignment is to start by stating the impulse relationship, use it to derive an expression for the average force acting on the carriage through the slow-down, show how you determined each part of the relationship (blurbing well as you go, and remember, you are going to be making approximations, so don't get too hung up on super accuracy), then put all those determined values into your derived expression for F (average) and come up with a number.

Anyway, that's it.

Oh, and when I did it, my number was somewhere around -4500 N (just so you have a ballpark figure to compare your results with).