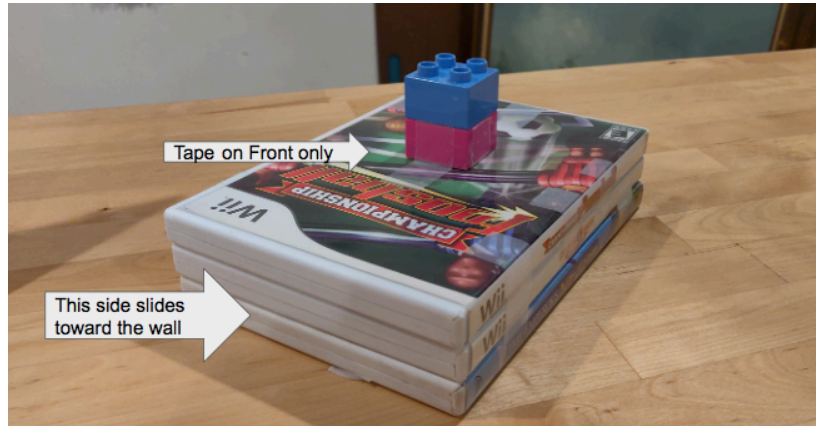# Corona Week 5 Impulse

`Crash Project`

Purpose: To reduce crash forces in a model vehicle.

Materials:
 - 3 DVD or video game cases (or a single cardboard box of similar size)
 - Tape
 - Paper
 - Cell Phone/Laptop Camera
 - Ramp
 - Something to prop up the ramp
 - Passenger (Lego block, iPhone charger block, or cell phone)

Tape on Front only

This side slides toward the wall

Instructions:
1. Set up up a ramp, as shown in the video.
    a) Ramp should be 11" high (the longest side of a piece of paper)
    b) Ramp should be 2 to 3 feet long.
    c) The base of the ramp should be 11" from a wall to crash into.

2. Tape 3 DVD cases together as shown in the video to make a vehicle.

3. Tape a passenger on your vehicle.
Choose one of the following:
    a) You can use your cell phone with the free app Phyphox to collect crash data. TAPE IT SECURELY!
    b) You can use two lego blocks or a cell phone charger block taped on one side as shown in the video.

4. Release your vehicle down the ramp. Either use Phyphox App to collect crash data (see next page for Phyphox setup) or film it (preferably in slo-mo) and note whether the block on top tumbles forward.

5. Now use a piece of paper to create a crumple zone of some sort attached to the front of the vehicle.

6. Send the vehicle down the ramp again.
Repeat with different paper bumpers until you achieve your goal:
    a) If you used the block, reduce crash forces enough so that the block does not tumble forward.
    b) If you used the Phyphox App, reduce the peak force by 1/2.

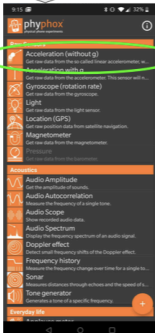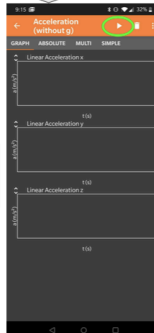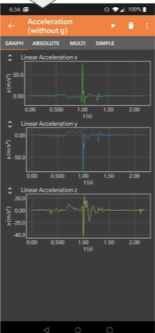| Share a google folder with the following:	
If you used the App: - Import collision data with and without bumper into Google Spreadsheet and graph. - Include picture of your bumper. - Explain in terms of impulse, force and time why your bumper worked.	If you used a block: - Include the videos with and without bumper. - Include a picture of your bumper. - Explain in terms of impulse, force and time why your bumper worked.

Instructions P1

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Let your vehicle slide down the ramp and impact the wall
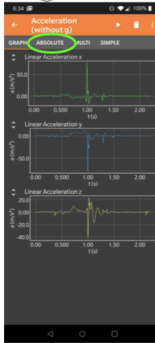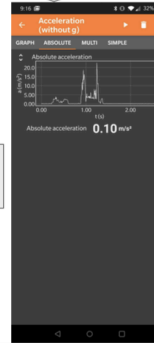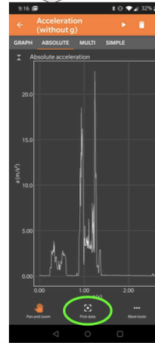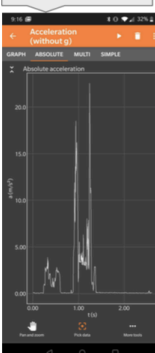
Next Slide

Instructions P2

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It will open this screen

Next Slide
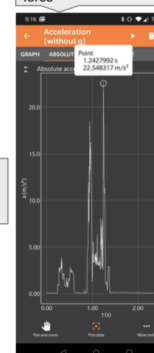
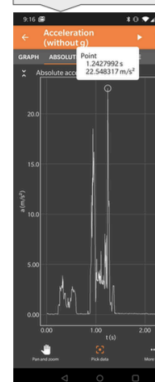# Instructions P3

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Save a screenshot of your peak force for documentation purposes

If you want to do more detailed analysis, you can export your data to excel. The next slides will detail that process.
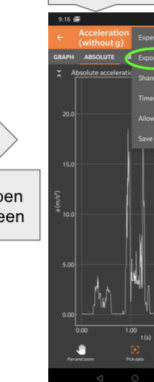
Exporting Data

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It will open this screen

It will open this screen