# Teacher Notes-Newton Car

First things first- watch these videos so you have a good idea what this is all about.

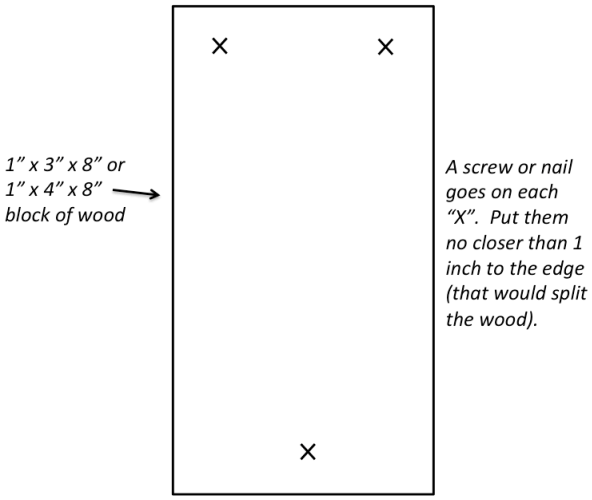
- https://www.youtube.com/watch?v=MhHj0xpAfDg (mute your sound first!)
- https://www.youtube.com/watch?v=_35ZZWF7Aio
- https://www.youtube.com/watch?v=tezdsh3bAcs
- https://www.youtube.com/watch?v=y73ZjWtSLYM

Reading over the lab, you'll notice pretty quickly that it gives students just enough structure that they know what to do; the rest they have to figure out on their own (nowadays we call this inquiry). Things will get a little messy. But your students will love the freedom, and will, in the end, get more out of the experience than if it had been a "cookie cutter" step-by-step lab.

Materials per group: Newton Car, canister, rubber band, string, some kind of mass to add to canister (pennies or paper clips or...), ruler, meter stick, round colored pencils or straws

Beforehand:

- Build the Newton Cars. There are different ways to do this, but the simplest ones consist of a piece of wood that's about 1" x 3" x 8", with 2 screws or nails near the front and one screw/nail at the back center.




- Other decisions:
  - What will the Newton Car be launching from it? It could fling a film canister, medicine bottle (ask a pharmacist for some), or even a cup that's fairly wide at the base.
  - How will you increase the mass of the canister? I used paper clips, but next time I'll try pennies.
  - How will the string be released? By lighting it or cutting it?
  - What will the car roll on? Straws or round pencils?
- Change the Student Handout as needed. There's a copy in Word format so you can do this.

- **Lastly**, you'll need to decide what 2 or 3 most important things are that will get done in this lab. (Bad idea- try to do everything.) Is it doing 1 experiment well? A top-notch lab report? Whatever you decide it is, keep it in sight so

everyone's always moving towards it. If students don't know what they're supposed to be doing, everything is wasted.

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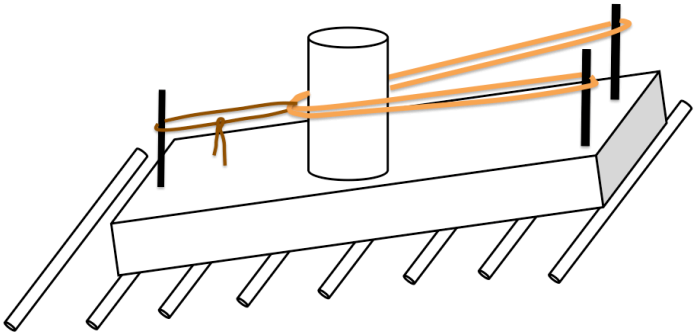
DAY ONE

On day 1, students won't have any idea what's going on, so take a few minutes to explain the project. Then allow time for students to get their hands on the cars. It would be very helpful if you had one set up in the launch position so students can see.



**String**- Each string needs to be 25 centimeters long, then knotted to form a loop. Pass the rubber band through the center of the loop of string, hook both ends of the rubber band onto the two screws/nails at the front of the car, pull the string back, and hook it onto the back screw/nail.

On day one, everyone is using an *empty* canister and *1* rubber band. At some point remind them that this will serve as the **control**. Later, when those variables are changed (the mass of canister is increased, as are the number number of rubber bands), we'll able to see their effect by comparing those results back to today's.

On day one, no predictions will be made because students aren't familiar enough with the cars to make a useful prediction.

When students get consistent launches, they can start recording data- how far both the Newton Car goes in one direction and the canister in the other. Once they've got 3 good launches measured, they've completed day 1's work.

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DAY TWO

Students are ready for day two when they've recorded how far the Newton Car launches the empty canister 3 separate times.

The first variable we'll change is...

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*REST REMOVED FROM PREVIEW*