**Thread NSTA Cheap Momentum Lab Question**

Lee Jones wrote:

Does anyone have a momentum lab that doesn't require motion detectors or other such equipment?  My physics supplies include only items you can buy at the local Walmart....
Thanks!

-- Lee
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Lee Jones
Dallas High School
Dallas, OR
Chem, AP Chem, Physics

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Hi,
SEE INDIVIDUAL FILES
In the PSSC program there are three nice activities.

The first involves "exploding" dynamics carts.  You do need dynamics carts with either magnets or springs to push carts apart.  Mass on carts can be varied using bricks.  This is not complex and most students can get the idea without much coaching.  The idea of distance traveled being proportional to time interval of travel which is the same for each of the two "exploding carts" does make for some cognitive difficulty for some students.

Another PSSC activity involves the colliding dynamics carts with ticker tape timers used to analyze the motion.  This is not for the faint of heart, but my wife wrote an activity sheet for this.  It is complex and may not be appropriate for all students.  It is somewhat in the Modeling style.  It is part of the AAPT/PTRA Teacher Resource Guide.  See Activity 3.pdf attached which includes some teacher notes and student data.

A third activity involves collisions in 2-D and is described in e-mail by Thomas Smith.  I have done this activity for many years and have attached a lab sheet also is part of the AAPT/PTRA Teacher Resource Guide.  This is a complex activity, but students do seem to get the idea with some classroom discussion. See Activity 8.pdf attached which includes some teacher notes and student data.  The key to getting good data is to be sure the target and incident balls are horizontal at the moment of impact, and that the incident ball is just clear of the ramp at the moment of impact.  The idea of distance traveled being proportional to time interval pops up here again, and in addition a review of projectile time of fall is appropriate.

Another possibility is to do a simulation.  This may also be used as introduction to or review of laboratory activities.  See Activity 4.pdf attached which includes some teacher notes and student data.

These may give you some ideas.

Jim Nelson

<http://vids.myspace.com/index.cfm?fuseaction=vids.individual&VideoID=32782133>
There are 6 episodes I believe.
Dean Baird has a worksheet to follow along with it
<http://homepage.mac.com/phyzman/phyz/BOP/1-05MOM/>
~Joe Mello

On Fri, Feb 5, 2010 at 10:21 AM, <Caroline.Cooney@mansfieldschools.com> wrote:

Hi...someone sent a link to the Jearl Walker video on Forces, but somehow I deleted it.  If you could send it again, I would very appreciative.

Thanks,

C Cooney

------Original Mail------
From: "Smith, Thomas" <smitht@loswego.k12.or.us>
To: "Lee Jones" <leejones15@gmail.com>,
<physics@list.nsta.org>
Sent: Tue, 2 Feb 2010 07:10:10 -0800
Subject: RE: Momentum

Lee - this involves a ramp and a couple of like-sized ball bearings. You determine an initial "momentum" of a single ball bearing going down a ramp and launching horizontally off of a table. Then you arrange an angled collision at the bottom of the ramp with another ball bearing - making sure that the collision occurs horizontally (tricky). Because the ball bearings fall for the same time and have the same mass you can show conservation of momentum as a vector by looking at the displacement vectors.

The science catalogues have prepared tools for this, but this is one you can construct without too much effort.

If you use different massed objects you would need to adjust your calculations. I'll add this as a follow on for those above average kids.

Say hi to Jacqueline - the choir director - for me.

Tom Smith

Lee,
  If you rollerblade, try this site:

<http://teachingphysics.wordpress.com/tag/momentum/>

It might have ideas even if you don't rollerblade.  Perhaps a student does and you can have him/her as part of the lab.  I don't think you will get the quantitative data you are looking for but I bet it will make more of a lasting impression.

Sincerely,

Greg

I ties two labs into this:
1. the egg drop...seeing who wins and taking videos.  They love replays!
2. the egg-in-the-sheet lab while some are waiting to drop the egg from the fire escape.

peace, bob

You can do the classic egg into sheet demo, or let the students do it. That lab is one of the more fun ones that they do all year, especially if someone misses the sheet.

We also shoot pool balls and confirm the 90 degree angle with which they depart the collision.

   Scott