**Thread NSTA Momentum Put it in everyday language Question**

-----Original Message-----

From: jillmclean27@gmail.com

Sent: Tuesday, January 10, 2012 3:00 PM

To: physics@list.nsta.org

Subject: Put it in everyday language

Hello all,

I am looking for some everyday words to use when explaining the meaning of impulse and momentum. Not force times time or change in mass time velocity. Anyone have some great descriptions to share?

Jill McLean

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"Physics is a foreign language that sounds just like English" - source unknown.

My advice: keep it straight. Your students are confused enough already.

Joe

???Just describe some of the impulsiveness shown by some of the kids today (chemically founded on sugar and junk).

They also amazingly seem to have great momentum to keep going because there is little friction in many classes to stop them or in home life to stop and do homework.

Yes, people are the bestest of all samples of education on the skids !-) We as teacher must provide much of the friction nowadays and also some of the lube to move things along smoothly.

Bob G

SciChair

Useful answer include how hard a hammer hits a nail (impulse) and much momentum a car has when it is traveling. A loaded pickup truck has a larger momentum than a small car traveling at the same speed. And a car that is speeding down the highway has more momentum than a car that is moving slowly.

Unfortunately, your complaining about student and parent behavior does little to help us with a good answer.

Jeff

I ask the kids whether they would rather be hit in the head with a Ping Pong ball or a Bowling ball.  The usual answer is a Ping Pong ball.  I suggest that it "depends."  Then break down the idea of momentum as mass times velocity and show them that each can have the same momentum depending on velocity.  I then load up my air cannon and show them how a Ping Pong ball can destroy a soda can when fired at high velocity.  Works pretty well...if you want to build an air cannon, its not too tough, lots of help on Google...you can see the effect here too:

<http://www.youtube.com/watch?v=F_o5W6dYQVs>

(PS:  Impulse comes in in this experiment by applying the force for a longer period of time as the Ping Pong ball accelerates down the "barrel" of the gun.  So it helps introduce Impulse-Momentum in dramatic fashion.  Credit is not mine but goes to Mr. Baird of Conceptual Physics with Paul Hewitt)

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Try this....  
Impulse is the "follow through" that the sports coach talks about. It is the combination of how hard you hit or push and how long you are pushing it. The strongest guy in the world can't bunt a baseball very far.  
For momentum, I like this explanation: momentum is how hard it is to stop a moving object.  Heavy and fast? Hard to stop. Light and slow? Easy to stop. (This ignores the direction part of the momentum vector, but at least it's a simple way to introduce the topic.)  
Good luck!

A great point!  The longer the push or pull is in contact with the object, the greater the change in momentum imparted to the object.  A "quick" bunt vs. a "long" bunt would be a fun schoolyard demo.  Get a baseball player and a softball player from the class to show proper technique.  Pitch the balls in slow to show the effect and make the point.  Let one ball just "bounce" off the bat, and let the other be "encouraged" for a longer period of time (i.e. "follow through" keeping the bat in contact with the "bunt" for a longer period of time.)  Make sure to "pinch" the bat to avoid smashed fingers and wear a batting helmet and safety glasses to reinforce lab safety!

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A cheaper and more interactive version of showing impulse than using an air cannon is to have the students shoot marshmallows by blowing through PVC pipe and gathering distance data. By using different lengths of PVC pipe ( applying the force of the air for a larger time) the marshmallow travels further and further. It is actually amazing the difference with only a modest difference in PVC pipe length. A 1m long pipe will probably shoot across the room and of course a 10cm one shoots only a small distance.

A word of caution: Any activity is only as good as the follow-up. What we have students do with the results of any activity is where the learning actually occurs. So I have them do a 5-7 line writing using a claim-evidence-reasoning framework so they try to explain it using the physics they already know, which is force. After all F=ma is a version of impulse- momentum. I put a few of there writings on the board and they pick them apart until the students have a version they think is workable.

And then there is another 5 line write about how this could apply to military applications, sports applications or any other ones that they can think of.

Alice Flarend

NBCT

Physics Teacher

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