RAFT IDEAS

Topics: Physics, Forces, Newton's Laws, Motion, Inertia

Materials List

- ✓ At least 6 cassette tapes (wrapped, if possible)

This activity can be used to teach:

- Balanced and unbalanced forces (CA Science Standards: Grade 8, 2.a – 2.f)
- Newton's Laws (CA Science Standards: HS Physics, 1.b – 1.d)

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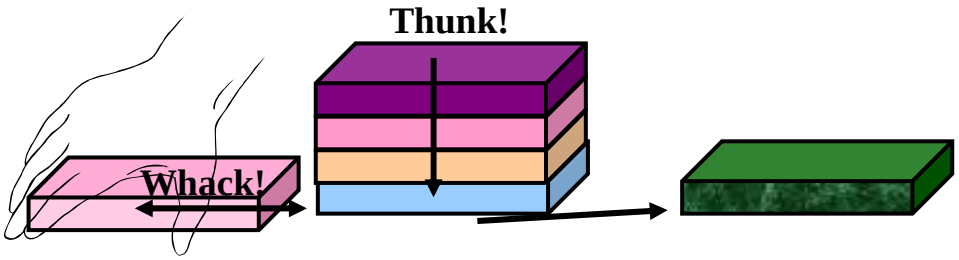
Whack a Stack!

A Quick Demonstration of Inertia



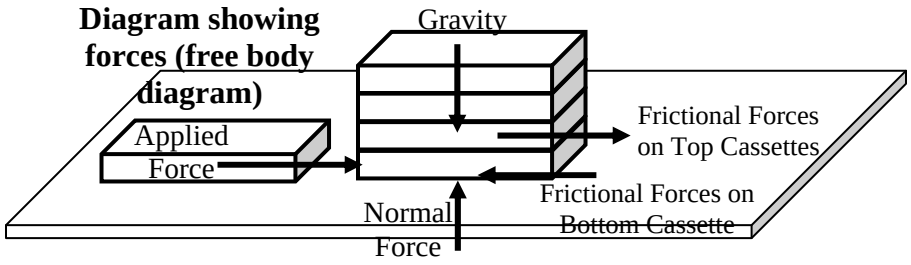
Students will enjoy participating in this quick demonstration of inertia!

To Do and Notice

1. Stack at least 5 cassette tapes on top of one another onto a large, flat, smooth surface (e.g. – demo table or linoleum floor.)
2. With a **QUICK back and forth** motion, use another cassette to **knock the bottom cassette OUT** from under the stack. The remaining cassettes should stay stacked and drop to the table together. It might require a little practice.
3. Repeat until only 1 cassette remains and the cassettes are scattered.
4. Practice different delivery techniques for effect: knock the bottom cassette from the side, whack the stack as quickly as possible, or use a variety of "whackers" (e.g. – ruler, pencil, dowel).

The Science Behind the Activity

The key concept here is inertia, or resistance to change in motion. Mass is a measure of inertia, as shown in Newton's Second Law, F=ma; for a given force, the larger the mass, the smaller the acceleration, or change in motion. The "whack" force applied to the bottom cassette is far larger than the opposing friction forces from the table and the remaining cassette stack, so the bottom cassette undergoes a large acceleration. Because of the frictional force between the bottom cassette and the cassette stack above it, the stack accelerates as well; but the force is small and only occurs for a very short period of time, and therefore doesn't give the relatively massive stack much acceleration before the bottom cassette is gone. So the stack just drops. Notice as the cassettes are knocked from the stack, the top stack moves farther. Since the stack has less mass, it has less inertia.



Taking it Further

For other demonstrations of inertia, see the RAFT Idea Sheets: ***The Old Tablecloth Trick*** and ***A Hole in One***

Web Resources (Visit www.raft.net/more for how-to videos and more ideas!)
For more information on Newton's Laws, visit Hyperphysics at:
http://hyperphysics.phy-astr.gsu.edu/hbase/newt.html#nt1

Activity Idea by RAFT Education Department
and Don Rathjen (Exploratorium's Teacher Institute)