

Family Adventures in Science

October 11, 2003

On your mark, get set, go.
The physics of motion.

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1) Why does something move? Because nothing stops it!

DEMO →

- *push a block, it moves but then it stops*
- *but a hockey puck on ice keeps moving*
- *has something to do with how slippery the surface is*

DEMO → the air track – the car glides on a layer of air

DEMO → *the car seems to go on forever!*

→ INERTIA *mass*

- something that is moving keeps moving in a straight line unless something else stops it.
- You don't have to keep pushing on something to keep it going if nothing is trying to stop it!

→ FORCES *a push or pull*

- If you want to move something that is just sitting there then you have to give it a push or a pull
- Forces are what makes things go faster or slower or turn around

DEMO → *when the car hits the end of the track it is given a bug push and it goes the other way!*

DEMO → *if you don't touch it, it will just stay put (marble and index card)*

DEMO → *be careful, if it starts goin, it might keep goin! (beads falling out of the jar)*

DEMO → *Why do you wear a seatbelt? Brakes stop the car, but what stops you? (Homer Simpson—Doh!).*

2) What goes up must come down. (Well usually.)

A long, long time ago, two great thinkers, Newt and Ari had a conversation that went something like this:

Ari: Hey Newton, why do things fall?

Newt: Because the earth pulls them down.

DEMO → *drop a ball*

Newt, you must be crazy, I don't see the earth pulling on anything.

DEMO → Newt pulled 2 magnets out of his pocket and showed Ari that one thing can attract or repel another thing even without touching it.

And so Newt explained to Ari that the earth can also pull on things even without touching them!

Another friend of theirs Galileo, came by and told Newt that not only did he already know that, but he also noticed that when he was dropping rocks off the top of an abandoned tower in his hometown, he saw that both the big ones and the little ones hit the ground at almost the same time.

→ All objects that fall down, go faster and faster by 32 feet per second every second!

Ari told Galileo that he was just as crazy as Newt and showed him that a coin will always beat a feather to the ground.

DEMO → Quarter and feather in vacuum.

3) Third and long - time for a pass – two-dimensional motion

- Motion can be horizontal and vertical at the same time.

DEMO → pop gun

- Horizontal and vertical motions are independent

DEMO → car on track that shoots a ball upward - where does the ball land?

DEMO → don't shoot yourself in the foot (or head either!)

DEMO → the down and out two-shooter

- Around in a circle

DEMO → let go of the ball going around the circle

4) Wanted: crash test dummies – collisions

DEMO → two-sided ball – which one knocks the block over?

DEMO → we've got the momentum on our side-

- a) two identical cars*
- b) little on big*
- c) big on little*

DEMO → They stuck together – inelastic collisions.

DEMO → the rocket car (you can run your car on air!)

DEMO → He pushed me first! - train going nowhere. → action/reaction

5) Want to be a figure skater? Better know your rotational dynamics!

DEMO → My head is spinning (skater)

DEMO → Could you please hold take unicycle?