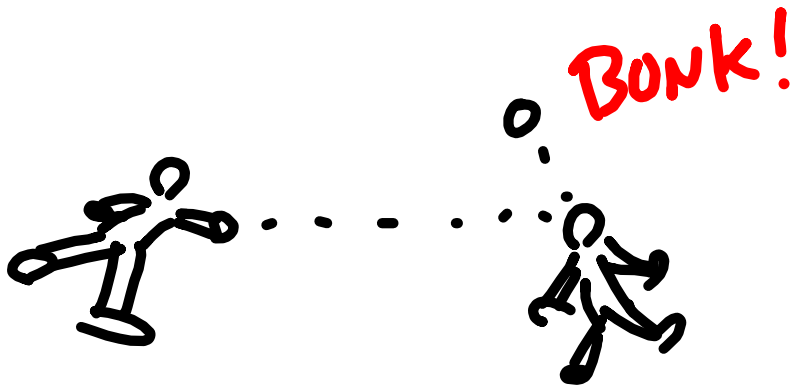


**Does it hurt to get hit with a baseball
(or anything else) in zero-g?**



Harmless practical joke, or a
way to lose your astronaut job?

Why do things hurt when they hit, or when you hit things?

1st Law

If the Net Force is zero in a direction, an object will maintain constant speed in that direction.

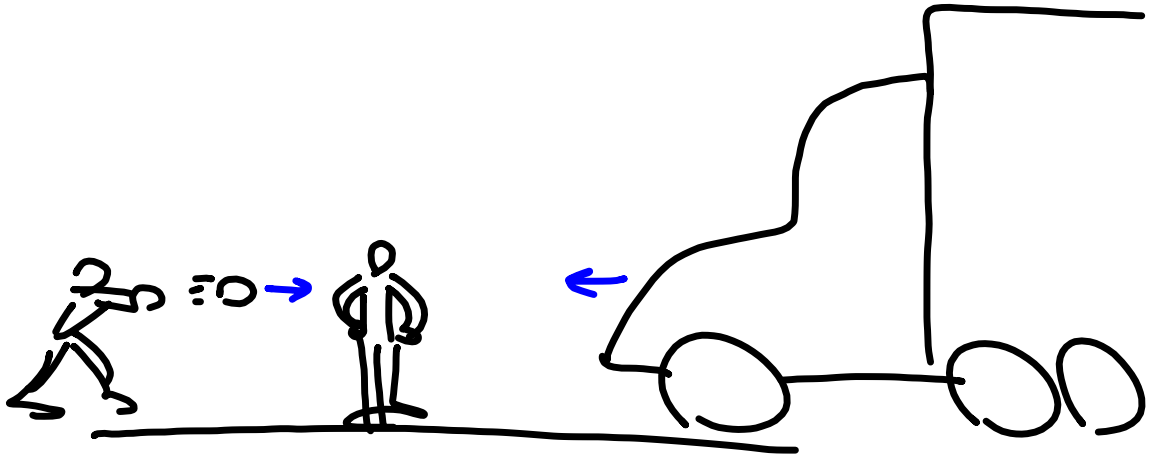
2nd Law

If there is a Net Force in a direction, an object will change speed in that direction.

→ Things don't change speed instantly.

That means that when objects collide, there is always some crunching together involved. Ouch!

Things hurt because they don't speed up, slow down, or turn quickly



Bigger things take longer to change speed, but is it due to their mass or their weight?

On Earth

You have MASS (the stuff)

You have WEIGHT (the pull of gravity)

In Zero-g

You still have MASS (the stuff)

But not weight - it's a weightless environment.

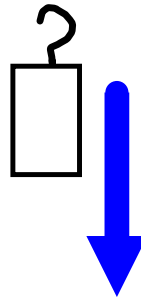
So is it mass or weight that makes things hurt when they hit?

(That makes things tough to speed up, slow down or turn)

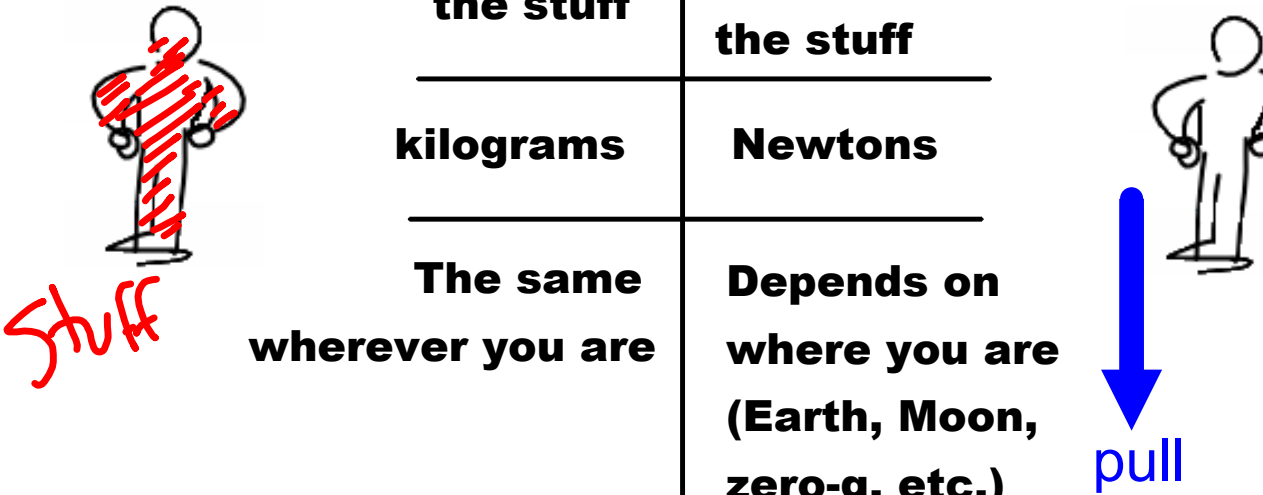
If it's a mass thing, they'll still hurt in Zero-g.

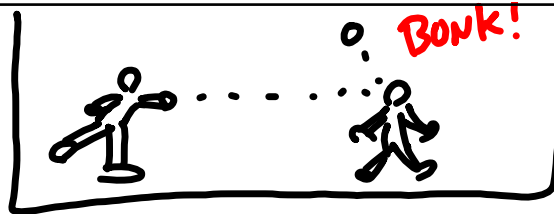
If it's a weight thing, then they won't.

1 kg weighs 10 N
of stuff pull of gravity



Mass	Weight
amount of matter the stuff	pull of gravity on the matter the heaviness of the stuff
kilograms	Newtons
The same wherever you are	Depends on where you are (Earth, Moon, zero-g, etc.)





Is it
Mass
or
Weight

**that makes things hard to speed up,
slow down or turn?**