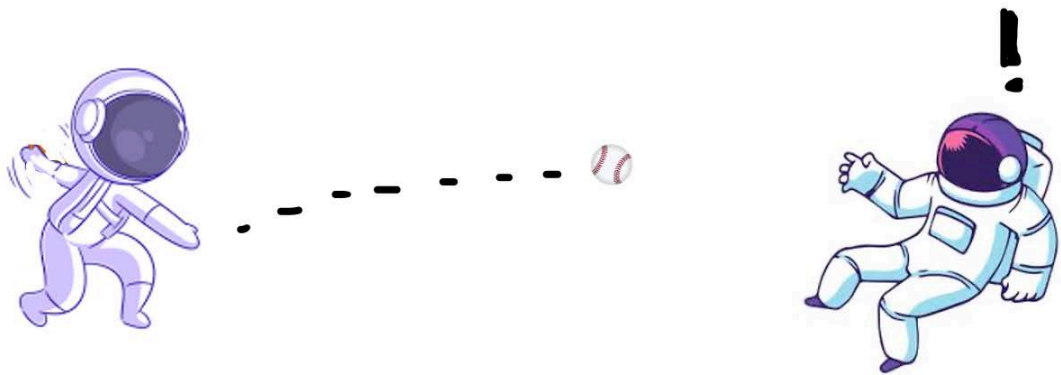


**Does it hurt to get hit with a baseball
(or anything else) in zero-g?**



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

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

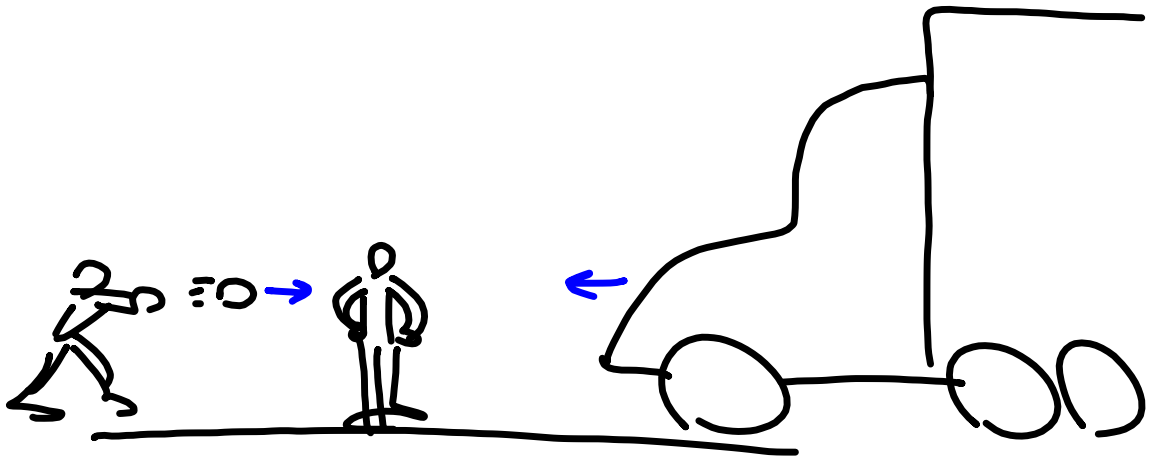
1st Law

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

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)

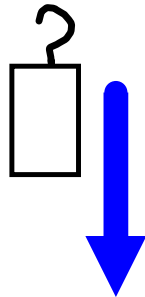
If it's a mass thing, they'll still hurt in Zero-g.

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

1 kg weighs 10 N

of stuff

pull of gravity



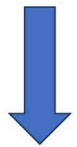


The Stuff

Mass	Weight
Amount of Matter	The Pull of Gravity on the Matter
The Stuff	The heaviness of the stuff
Measured in units of Kilograms!	Measured in units of Newton's!
The same wherever you are	Depends on where you are.
Makes things hard to speed up, slow down, or change direction!	Makes things fall, tough to lift, and tough to hold in place!



The Pull



Is it
Mass

or

Weight

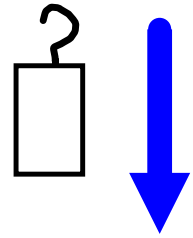
**that makes things hard to speed up,
slow down or turn?**

1 kg weighs 10 N

of stuff



pull of gravity



It's

Mass

The Stuff

MASS (the stuff)

Makes things tough to speed up, slow down or turn.

(Which is why things can hurt when they hit you.)

Weight makes things hard to lift and hold in place, and causes them to fall when you drop them.