Inertia – Newton's 1st Law

Inertia = property of an object that resists change in motion. (object likes to keep doing what's it's already doing)

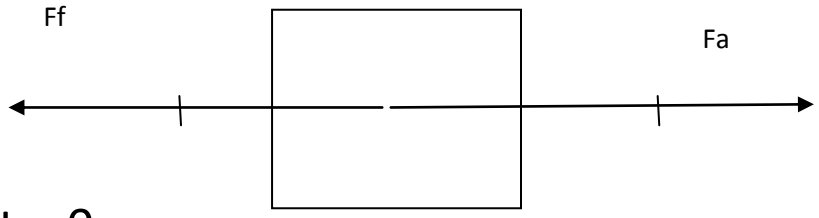
Galileo's Thought Experiment – in text

*you should be familiar with his famous thought experiment in which he concluded that in a frictionless environment, a ball will roll forever. It does NOT require an applied force as previously thought (Aristotle) *

Sketch below:

Newton → used Galileo's idea and applied to moving and non-moving objects.

Newton's 1st Law – an object in motion will stay in motion and an object at rest will stay at rest UNLESS acted upon by an unbalanced force.



Fnet = 0

Fnet = sum of all forces – if Fnet = 0, you have balanced forces.

That block could be at rest and staying at rest….or…

Moving → and still moving → at constant speed.

Unbalanced Forces

If, in the above example, Fa ≠ Ff then you have unbalanced forces. Fnet ≠ 0. In this case, the object will accelerate.

Unbalanced forces cause the following:

1. Object starts moving
2. Object stops moving
3. Object speeds up
4. Object slows down
5. Object changes direction
6. Object is deformed (think car crash!)

The first 5 are clearly examples of acceleration. Either the speed is changing or the direction is changing. Since acceleration is a vector, if I change speed or direction, I am accelerating and acceleration requires an unbalanced force.

X/Y planes

Remember to analyze the 'x' plane and 'y' plane of motion separately. Typically, this means analyzing the vertical motion (and forces) separately from the horizontal motion (and forces).