Forces and Newton’s First Law
Inertia is an object’s resistance to changing its motion.
Velocity is speed and direction.

What is the velocity of the racecar?

Review: What is speed?

What is the velocity of the racecar?

Acceleration is a change in velocity.
A force is a push, pull or twist

Examples of contact forces

Applying a force can change an object’s velocity.

Applying a force can cause an object to **accelerate**.
Types of Forces

Contact forces: interactions between objects that touch

- applied force
- spring force
- drag force
- frictional force

Non-contact forces: attract or repel, even from a distance

- magnetic force
- electric force
- gravitational force
Deciphering Newton’s First Law

“Every body persists in its state of being at rest or of moving uniformly straight forward, except insofar as it is compelled to change its state by force impressed.”
—Sir Isaac Newton
Principia Mathematica (1687)

Write: In your own words, what does this mean?

Unless an unbalanced force acts on an object,
- An object at rest stays at rest
- An object in motion stays in motion
Newton’s First Law of Motion

Objects in motion stay in motion and objects at rest stay at rest—unless acted upon by an unbalanced force.

Also called the “law of inertia.”
Unbalanced Forces

What two forces are acting upon the umbrella?

- 7 Newtons: weight (gravitational force)
- 3 Newtons: drag (air resistance)
Galileo Galilei: “I found it first!”

I call it “inertia.”

**Inertia** is an object’s resistance to changing its motion.

I wrote:

“A **body moving on a level surface will continue in the same direction at constant speed unless disturbed.**”

Sure, Newton stated it more thoroughly, but they don’t call me “the father of modern physics” for nothing!
Egg Inertia Puzzle

What’s different about these two eggs?
1. An object’s resistance to changing its motion is called **inertia**.

2. Velocity measures **speed** and **direction**.

3. A change in velocity is called **acceleration**.

4. A **force** is a push, pull or twist.

5. Kicking a ball is an example of a **contact** force.

6. Newton’s first law of motion: Objects in motion will stay in motion and objects at rest will stay at rest, unless acted on by **an unbalanced force**.