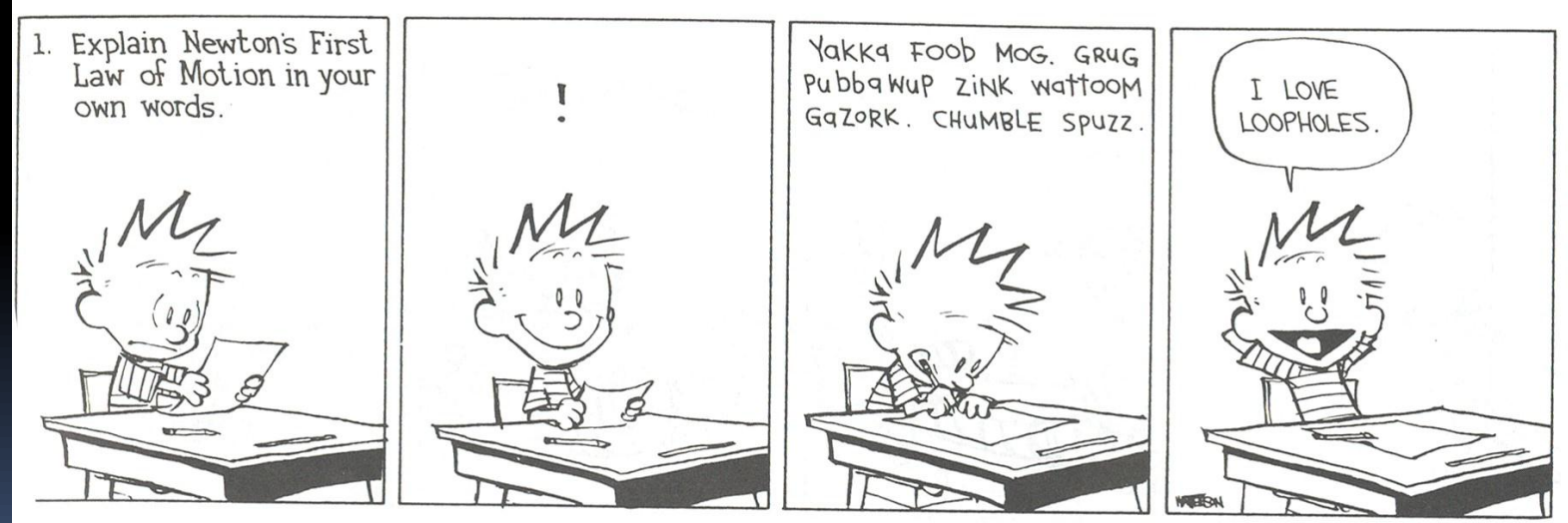


Newton's First Law of Motion



Newton's First Law of Motion



Newton's first law is often called the law of inertia.

Every object continues in its state of rest, or of motion in a straight line at a constant speed, unless it is compelled to change that state by forces exerted upon it.

Newton's First Law of Motion

Mass is the measure of inertia of an object. In the SI system, mass is measured in **kilograms**.

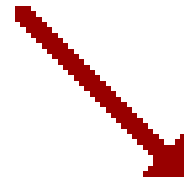
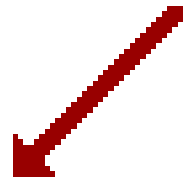
Mass is not weight:

Mass is a **property** of an object. **Weight** is the **force** exerted on that object by gravity.

If you go to the moon, whose gravitational acceleration is about $1/6 g$, you will weigh much less. Your mass, however, will be the same.

Newton's First Law of Motion

Forces are Balanced



Objects at Rest
($v = 0 \text{ m/s}$)

Objects in Motion
($v \neq 0 \text{ m/s}$)



$a = 0 \text{ m/s}^2$



$a = 0 \text{ m/s}^2$

Stay at Rest

Stay in Motion
(same speed and dir'n)

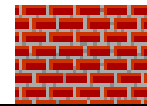
Newton's First Law of Motion

A person in motion tends to stay in motion with the same speed and in the same direction ... unless acted upon by the unbalanced force of a seat belt.

The seat belt provides the unbalanced force which brings you from a state of motion to a state of rest.



Newton's First Law of Motion



Newton's First Law of Motion

EXAMPLES

- blood rushes from your head to your feet when riding on a descending elevator which suddenly stops.
- the head of a hammer can be tightened onto the wooden handle by banging the bottom of the handle against a hard surface.

Newton's First Law of Motion

EXAMPLES

- to dislodge ketchup from the bottom of a ketchup bottle, the bottle is often turned upside down, thrust downward at a high speed and then abruptly halted.
- headrests are placed in cars to prevent whiplash injuries during rear-end collisions.

Newton's 1st law movie