

Isaac Newton's Laws of Motion



1. Go to discoveryeducation.com
2. With the login information provided to you, log in.
3. Go to assignments.
4. Click on the assignment "Newton's Laws of Motion."
5. Follow the instructions within the assignment to complete this guide.

Born: **Jan. 4, 1643**
Location: **United Kingdom**

Working through school I...
waited tables
cleaned rooms

My famous publication was called:

Principia Mathematica
(**Mathematical Principles of Natural Philosophy**)

Many described my publication as **the most important book** because **it was a written** working mathematical system ~~was~~ based on **experiment**

In my book, I defined 3 important terms...

1. **mass**
2. **types of forces**
3. **inertia**

From these definitions, I formulated...

3 Laws of Motion
- **basis of modern science**

In my Principia, I explain...

1. **Structure of the universe**
2. **how to find masses of planets**
3. **why the Earth is flat at the poles + bulge at equator**
4. **how tides work**

TRUE My Laws **DO** have a HUGE impact on everything we do.

My FIRST LAW, also called: Law of Inertia states....

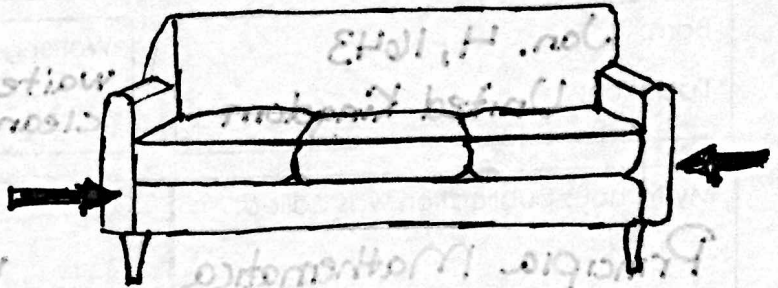
Objects tend to keep on doing what it is they're doing (resting or moving) unless something else exerts a force on them.

The force discussed in this law is called Net force.

The couch DOES NOT move because....

The forces are balanced & cancel each other out

This is called balanced forces

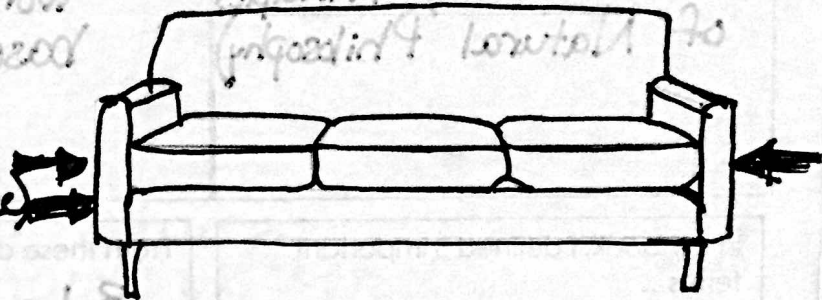


This time, the couch DOES move because....

the couch has a net force

This is called unbalanced forces

***we must consider direction when thinking about this



My SECOND LAW states... $F=ma$
a net force acting on an object causes the object to accelerate

ACCELERATION is defined as...

Any change in an object's speed or direction

Acceleration depends on Force & mass

My THIRD LAW states...

When one object exerts a force on another object, the second object exerts an equal & opposite force

If you let go of a piece of candy in the classroom...

m dropped to ground

Because... force exerted on candy (gravity)

BUT...when the astronaut let go of the candy, it...

floats (doesn't fall)

Because...

there is no gravity (no force on it)

FIRST PHYSICS LAW OF CARTOONS



GRAVITY WILL NOT WORK
TILL YOU LOOK DOWN...

The 1st Law of Motion revisited...

Different forces are at work such as....

| Type of force | Direction of force |
|---------------|-----------------------------------|
| Gravity | down |
| Friction | Resisting Force slows things down |

When all of these forces act together, this is called 'a battle of forces'

Eventually, these forces... balance each other out reaching equilibrium

The 2nd Law of Motion revisited...

Thinking about $F=ma$...

The differences in acceleration between the candy & hammer...

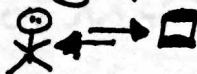
| Candy | Hammer |
|-----------------------------------------------|-----------------------------------------------|
| $F = (\text{small mass}) (\text{big accel.})$ | $F = (\text{big mass}) (\text{small accel.})$ |

'bigger m' → 'smaller a'
'small m' → 'bigger a'

The 3rd Law of Motion revisited...

When the astronaut pushed away from the water jug....

The astronaut ~~is~~ and jug pushed off in opposite directions



In terms of the 3rd Law, a rocket can "lift off" because...

Rockets 'throw out' their propellants out of engines
 • Gases push out of rear of rocket. Gasses push back on rocket pushing in up into space

