

NEWTON'S LAWS

Newton's First Law

- Law states:
 - An object at rest will stay at rest, an object in motion will stay in motion, unless acted on by an outside force.
- a.k.a
 - Law of inertia
- Jurisdiction:
 - the law can only be applied in inertial (non-accelerating) reference frames

Inertia

- What is it?
 - An object's tendency to resist change
- What causes it?
 - Mass
 - More mass = more inertia

Newton's Second Law

- Law states:
 - any net force applied to an object will cause the object to accelerate in the direction of the force.
- a.k.a
 - $F = ma$ (Measured in Newtons , N)
- Jurisdiction
 - same as first law

Net Force

- Definition
 - the "sum" of all forces acting on an object.
- Result
 - an acceleration in the direction of the force.
 - If zero, the object is at rest or moving with a constant velocity.



Special Case : $F=ma$

- Codename: Weight
- Equation: $W = mg$
- Units: Newtons
- Alias: pounds(lbs)
- Conversions: 2.2 lbs in 1kg
4.45 N in 1 lb

The Weight Zone

- **Example**
 - An unsuspecting gentleman steps into an elevator. Unknown to him, he has step into the “weight zone”. He presses the button for the top floor, the doors close and he instantly begins to feel an increased pressure on his feet. It only lasts a second, then the pressure returns to normal. Then as the elevator nears the top floor, the gentleman feels lighter than air. What causes these mysterious feelings in the “weight zone”?

Newton’s Third Law

- **Law States**
 - For every action, there is an equal and opposite reaction.
- **a.k.a.**
 - Law of interaction
- **Use extreme caution**
 - forces act in pairs
 - be sure the forces are acting on opposing objects (Figure 4.12, p 111)

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