

## Newton's 1<sup>st</sup> Law of Motion

“for assuredly, I say to you, if you have faith as a mustard seed, you will say to this mountain, 'Move from here to there', and it will move; and nothing will be impossible for you.” Matthew 17:20

### Details of Newton's 1<sup>st</sup> Law

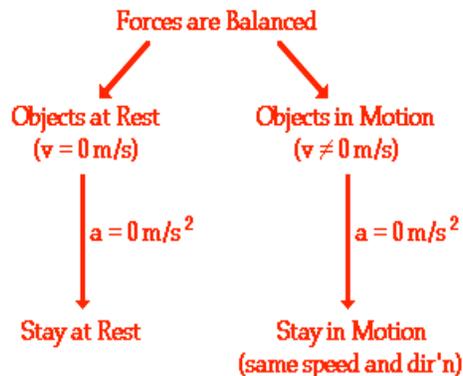
- An object at rest stays at rest and an object in motion stays in motion with the same speed and in the same direction unless acted upon by an unbalanced force
- remember that “force” is any push or pull that makes an object move OR stop moving
- also called the law of inertia where  
inertia: the resistance of an object to a change in its motion or lack of motion

### Object at rest

- an object at rest tends to stay at rest unless acted upon by an outside force; if nothing happens, it will not go anywhere  
example: getting out of bed in the morning :o)
- if an object is at rest then its velocity = 0 m/s
- rest cannot change without an unbalanced force acting; the force making an object stay at rest must be greater than the force making the object move
- example: You have a cup of soda in the car. The soda is perfectly happy and still in the cup. When the car starts to move, the car and the cup accelerate out from under the cup because the soda is exhibiting inertia - it wants to stay where it is.

### Object in motion

- an object in motion tends to stay in motion with the same speed and direction unless acted upon by an outside force; it will continue to go in that direction at that speed forever  
example: astronaut in space
- if an object is in motion then its velocity DOES NOT EQUAL 0 m/s
- motion cannot change without an unbalanced force acting; the force making an object move must be greater than the force making the object stay in place
- example: When you are riding your skateboard and your skateboard hits the curb, your skateboard stops but YOU keep flying forward in the same direction you were originally traveling. You are exhibiting inertia because you are continuing at the same speed and direction.



- REMEMBER that acceleration = change in velocity divided by time  
SO if the velocity and direction stay the same then there is NO acceleration or a=0 m/s<sup>2</sup>