A Brief History of Motion

Aristotle, Galileo, and Newton

Aristotle

(384-322 BCE)

- Proposed that every terrestrial object (things that are on earth) had a natural motion toward the center of the universe (Earth)
- To move otherwise, an object would be in violent motion under the influence of an external force
- A continually applied force was required to keep everything moving.

Problem with Aristotle's Ideas

- What about an arrow flying through the air?
- Aristotle said that the air must be pushing it forward.
- Many critics pointed out that this would mean that the air was both slowing the arrow down (resistance) and speeding it up (pushing it)

Aristotle's Influence

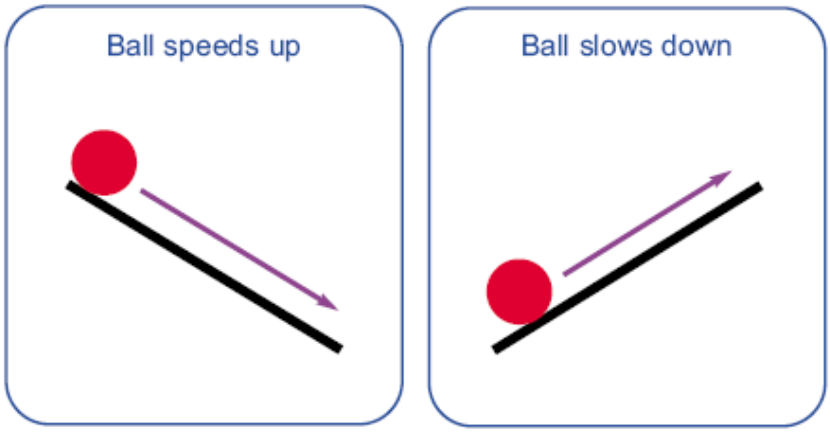
- Aristotle was a very influential person
- His ideas were believed to be correct for centuries (or even millennia) because he was considered to know better than everyone else
- It was about 2000 years later when Galileo challenged Aristotle's ideas.

Galileo

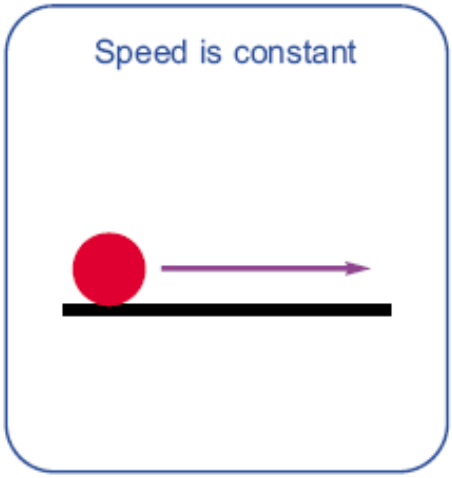
(1564-1642)

- Thought that inertial (non-accelerating) motion was circular
- He proposed a series of though experiments to provide proof for his ideas

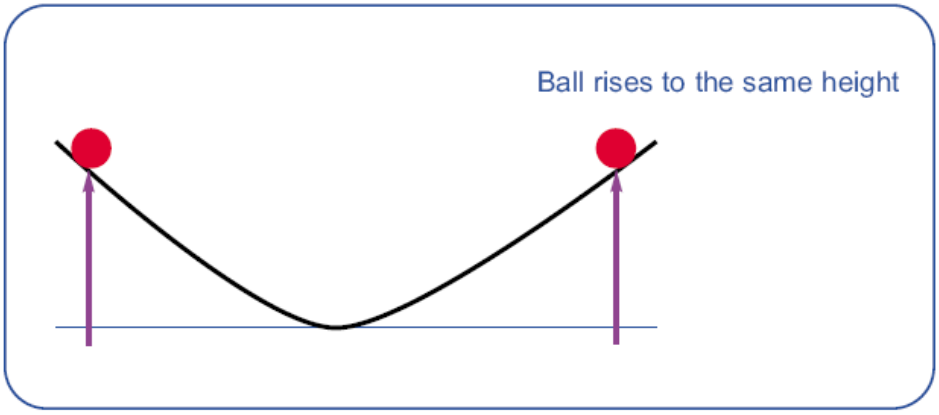
A ball rolling down a plane speeds up and a ball rolling up a plane slows down.



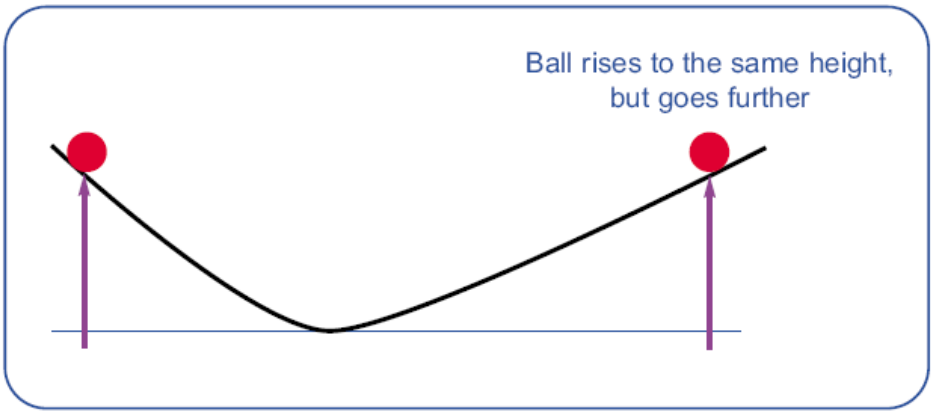
Therefore, a ball rolling on a level surface should have a constant speed.



A ball released down the plane will rise on the other side to the same height.



If we decrease the angle, the ball will still rise to the same height, but will have to travel further to get there.



- If we continue to decrease the angle, then we can conclude that the ball will travel forever, trying to get back to its initial height.

Newton
(1642-1727)

- Synthesized (mathematically described) inertial (non-accelerating) motion.
- Called **Newton's First Law of Motion**:
  - An object in motion will stay in motion, moving in a straight line, unless acted on by an unbalanced force. At object at rest will stay at rest unless acted on by an unbalanced force.