

## A Brief History of Motion

Aristotle, Galileo, and Newton

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### 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.

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### 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)

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## 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.

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## Galileo

(1564-1642)

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

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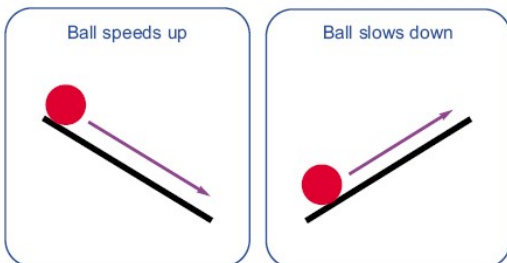
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A ball rolling down a plane speeds up and a ball rolling up a plane slows down.



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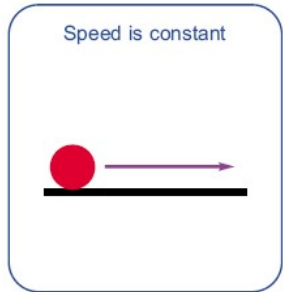
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Therefore, a ball rolling on a level surface should have a constant speed.



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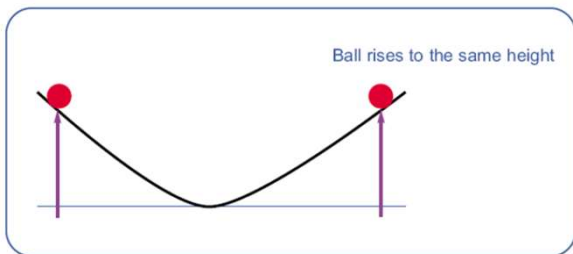
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A ball released down the plane will rise on the other side to the same height.



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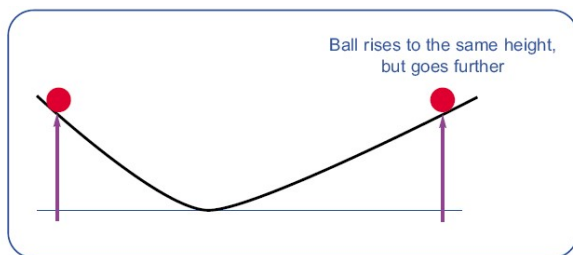
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If we decrease the angle, the ball will still rise to the same height, but will have to travel further to get there.



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- 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.

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## 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.

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