

Newton's Laws of Motion



**HOW AND WHY
OBJECTS
ACCELERATE**

Newton's First Law: Inertia

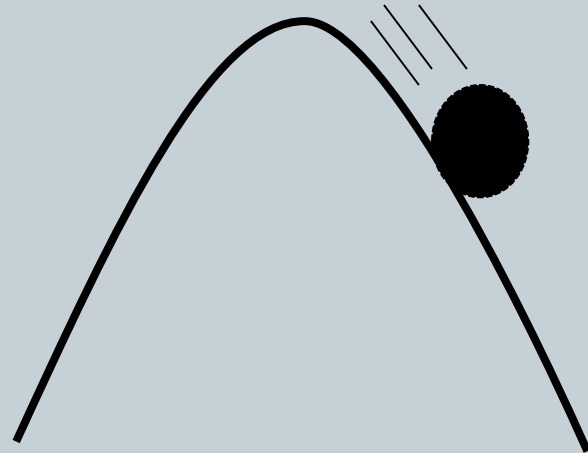
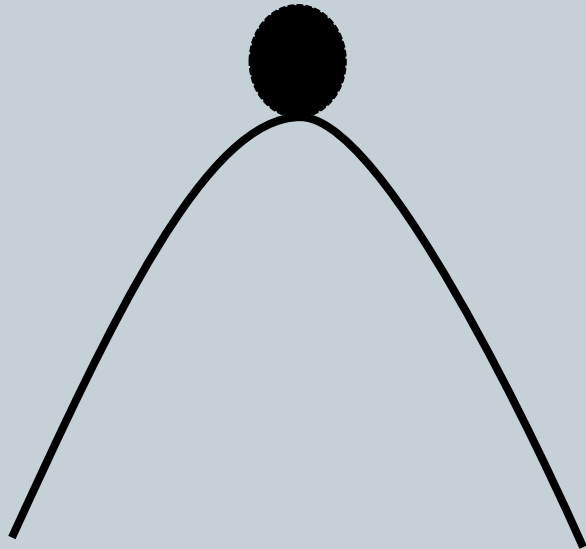


- An object at rest will remain at rest, or an object in motion will remain in motion (at constant velocity) unless acted upon by an unbalanced force.
- Also known as an object's tendency to resist a change in its momentum and velocity.
- The more mass an object has, the more inertia it will have.

Examples of Inertia



- A ball on a flat surface above a hill.
- A ball rolling down a hill.



Newton's Second Law:

$$F=ma$$



- Known also as the Law of Acceleration.
- An unbalanced force being acted upon an object is proportional to its mass times its acceleration.
- If there is no force, there is no acceleration and no change to the object's velocity.
- Force is measured in Newtons (N), mass in Kilograms (Kg) and acceleration in meters per square second(m/s^2).

Examples of Forces

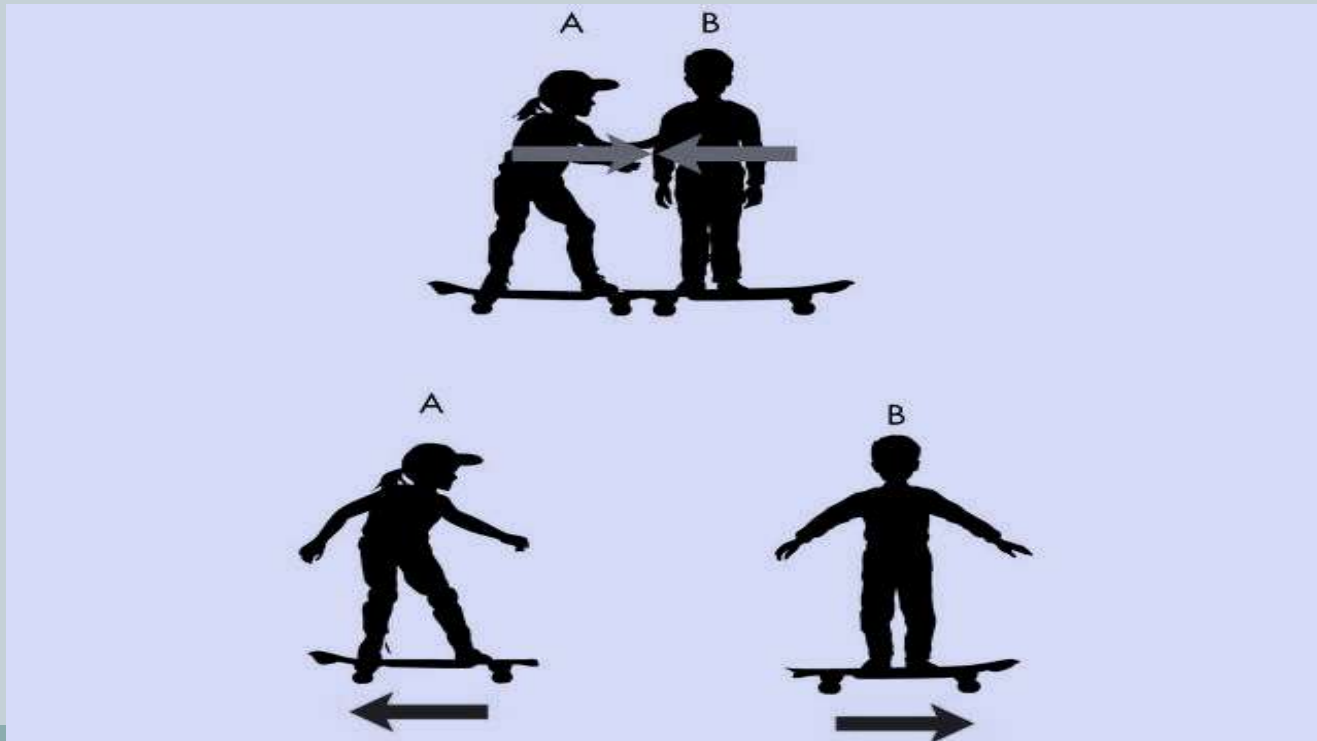


- A force is a push or a pull on an object.
- Kicking a ball with a 10 N force.
- Pushing a 12 Kg cart with a push of 5N.
- Accelerating a 2000Kg car at a rate of 20 m/s^2 .

Newton's Third Law: Equal and Opposite Forces



- Every action force has an equal but opposite reaction force acting on it.
- All forces must act in pairs.



Which Law is it??

1. Inertia 2. $F=ma$ 3. Equal & Opposite



A ball rolling down the street.

Sitting in a chair, and it doesn't break.

A rocket shoots explosive gases out its tail in order to reach outer-space.

Kicking a football.

A 10 Kg block accelerates at 4 m/s^2 .

Which Law is it??

1. Inertia 2. $F=ma$ 3. Equal & Opposite



A man jumping out of a boat, and the boat moves away from him.

When the car stops, you are pushed into your seatbelt.

A cannon shoots a cannon ball.

A car slams into a brick wall.

A balloon, full of air, is let go of and flies away.