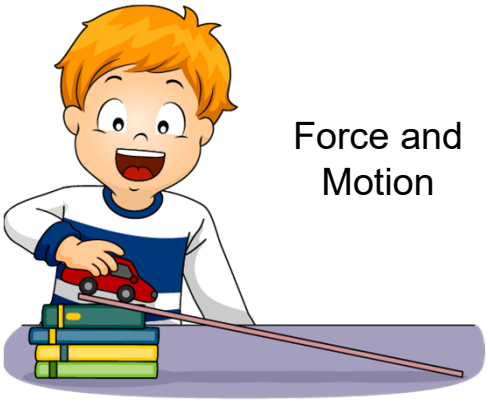
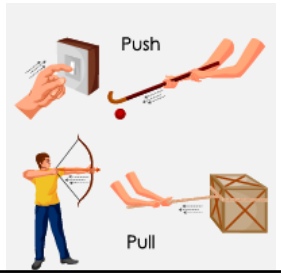


Force and Motion

Lorelyn Medina (Adobe Stock Photo)

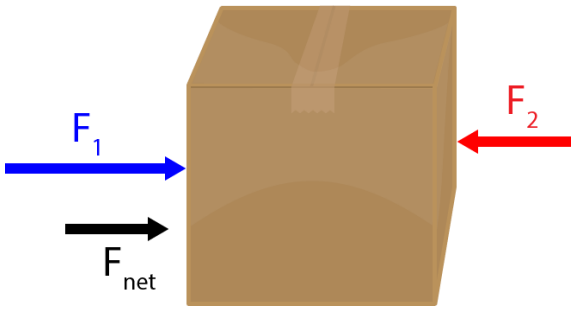
Force

- **Force** is the cause of motion.
  - A force is a push or a pull on an object.

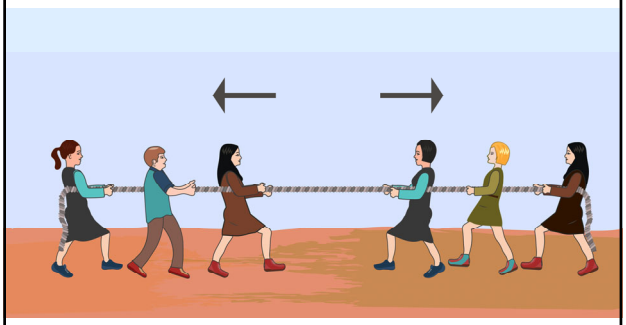


vecton (Adobe Stock Photo)

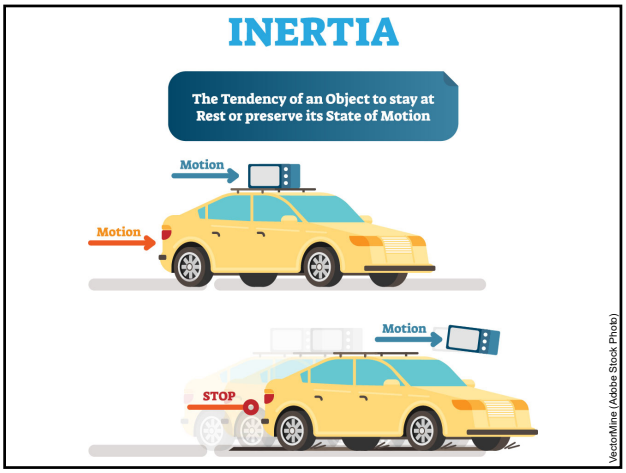
- When multiple forces act on an object, the forces combine.
  - The total force is called the **net force**.



- Forces are considered **balanced** when the net force equals zero.



Fridas (Adobe Stock Photo)



VectorMine (Adobe Stock Photo)

- The inertia of an object is proportional to the mass of the object.
  - The inertia of a large truck is greater than that of a toy car.

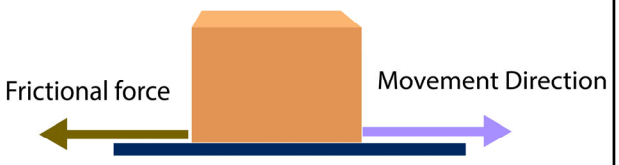
Truck – F. Muhammad (Pixabay)
Car – Flkri Hasan (Pixabay)

Newton's First Law
(The Law of Inertia)

A body at rest tends to remain at rest. A body in motion tends to move in a straight line with a constant speed unless acted upon by an unbalanced force.

Friction

- Friction is an external force that opposes motion.
  - To make an object move with constant velocity, a force equal to the force of friction must be exerted on the object.



fridas (Adobe Stock Photo)

Egg Drop

https://youtu.be/zEuelWMRXNQ

Spinning Penny

https://youtu.be/pKYyfPaS19M

Newton's Second Law

$$F_{net} = ma$$

Where $\boldsymbol{F_{net}}$ is the net force, $\boldsymbol{m}$ is the mass of the system, and $\boldsymbol{a}$ is the acceleration.

STEMonstrations: Newton's 2nd Law of Motion

https://youtu.be/sPZ2bjW53c8

Newton's Second Law of Motion

https://youtu.be/iwP4heWDhvw

Newton's Second Law of Motion
Science of NFL Football

https://youtu.be/qu_P4lbmV_I

Newton's Third Law

For every action force, there is an equal and opposite reaction force.

Forces always come in pairs (an action force and a reaction force).

Designua (Adobe Stock Photo)

Water Bottle Rockets

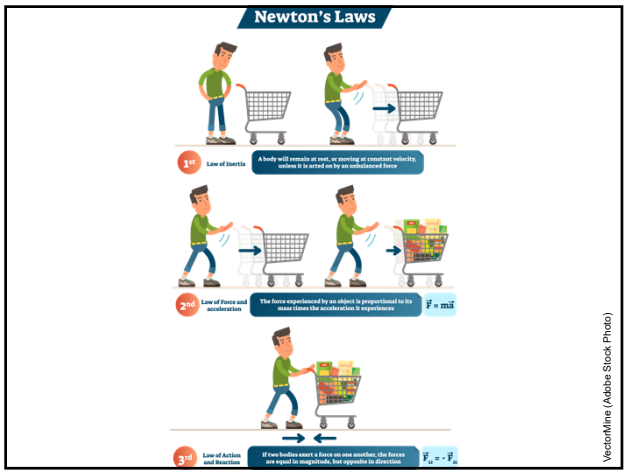
https://youtu.be/ii6D1R6IXVA

Newton's 3rd Law Explained with Skateboard, Rocket

https://youtu.be/Xx9kiF00rts

Newton's Three Laws Cannon

https://youtu.be/-5PmItK82JY



VectorMine (Adobe Stock Photo)