



FORCE AND PRESSURE



Introduction

What do you do to make a football move?

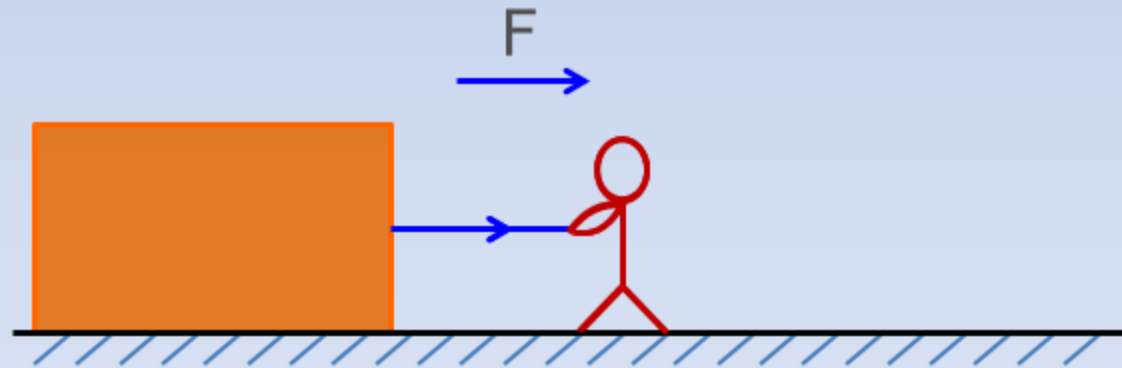


Force – A Push or a Pull

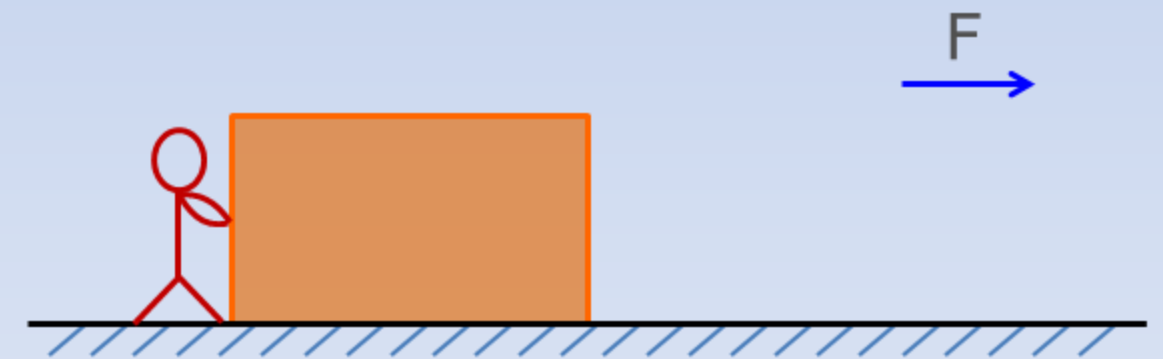
Force has been applied on a ball when it is **kicked**

A Push or Pull on any object is called a **Force (F)**

The **motion** imparted to objects was due to the action of a force



Pulling an object



Pushing an object

Forces are due to an Interaction

Suppose a man is **standing behind** a stationary car

Will the car **move** due to his presence? **No**

←
Direction of motion



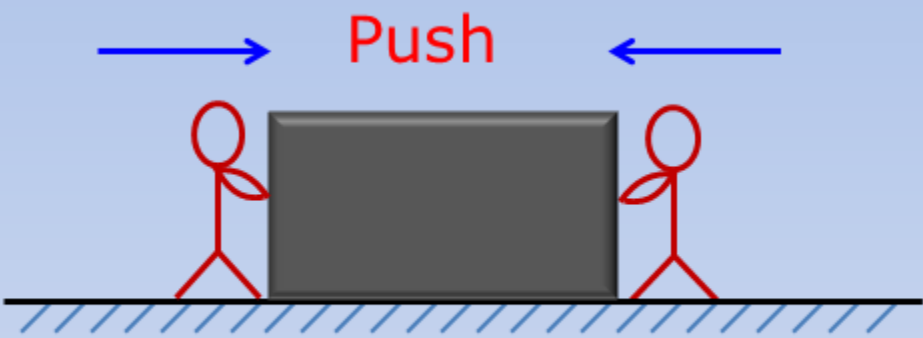
Man now begins to **push** the car

the car may begin to move **in the direction** of the **applied force**

Forces are due to an Interaction

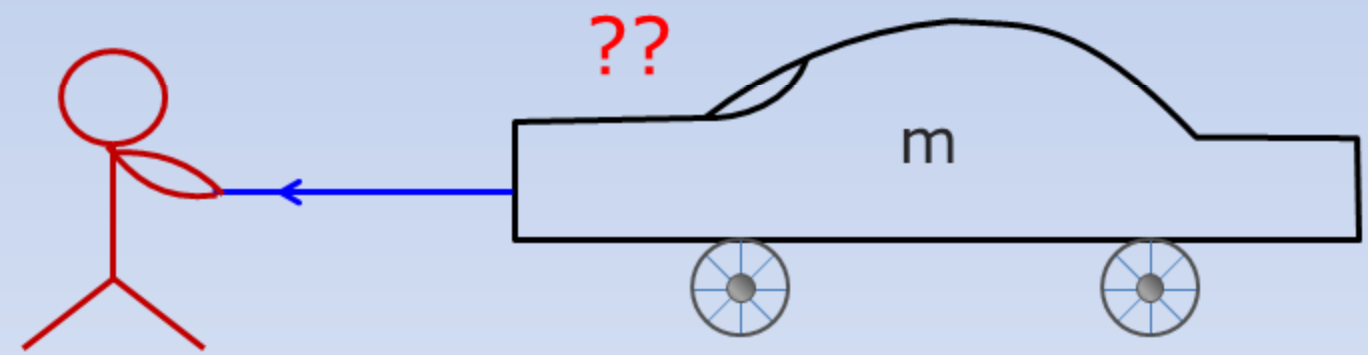
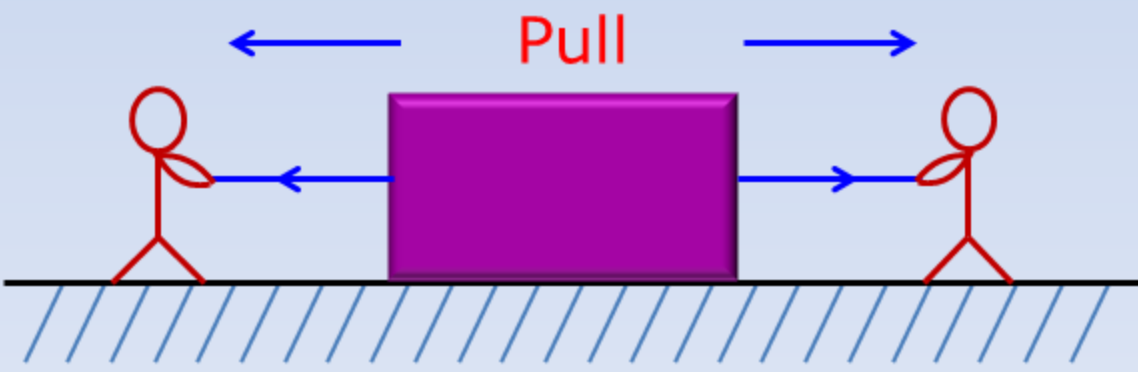
Considering **three** situations

Can you decide who is **pulling** and who is **pushing** in these cases?



Both the boys appear to **push** each other

Both the boys trying to **pull** each other

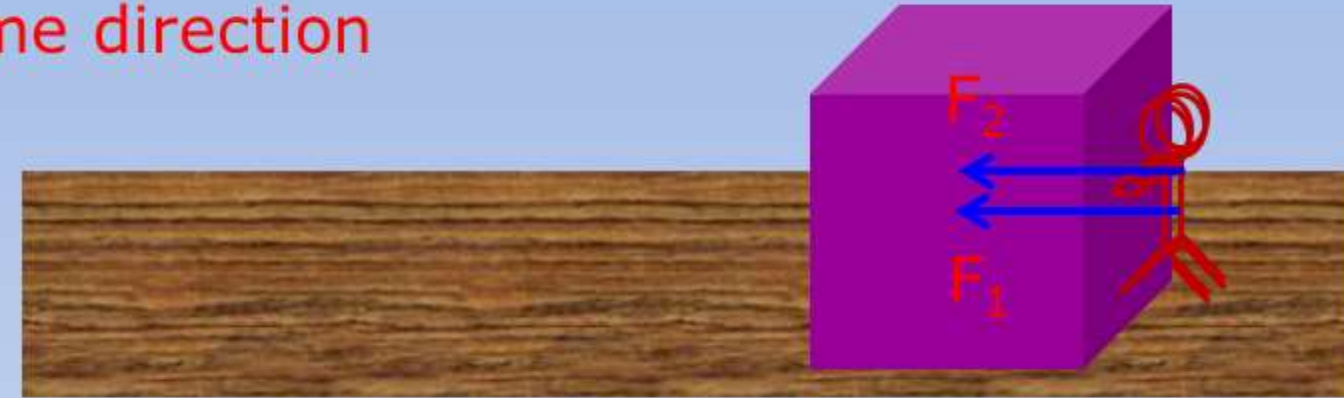


At least **two objects** must interact for a force

to come **into play**.

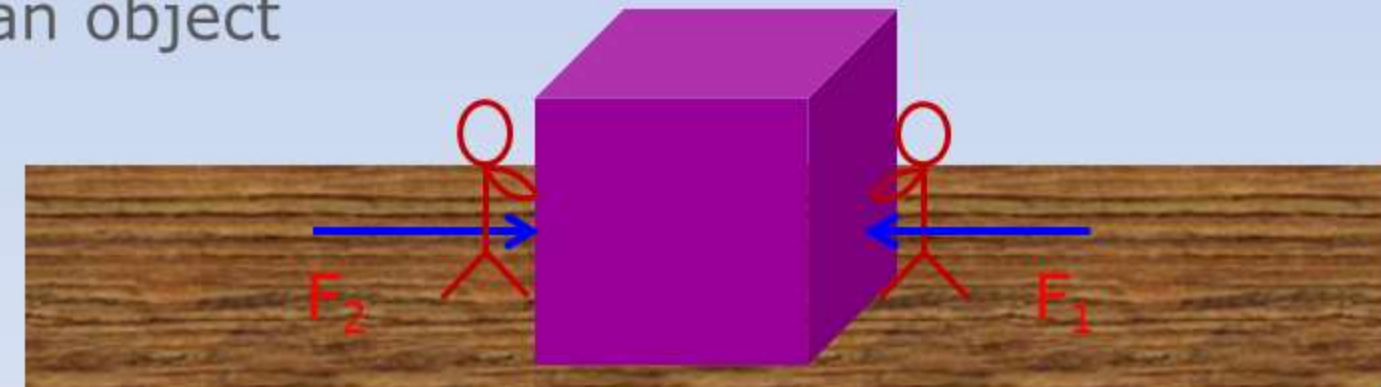
Exploring Forces

- Two forces are applied on an object in the **same direction**



The **net force** acting on it is the **sum of two forces**

- Two forces act in the **opposite directions** on an object



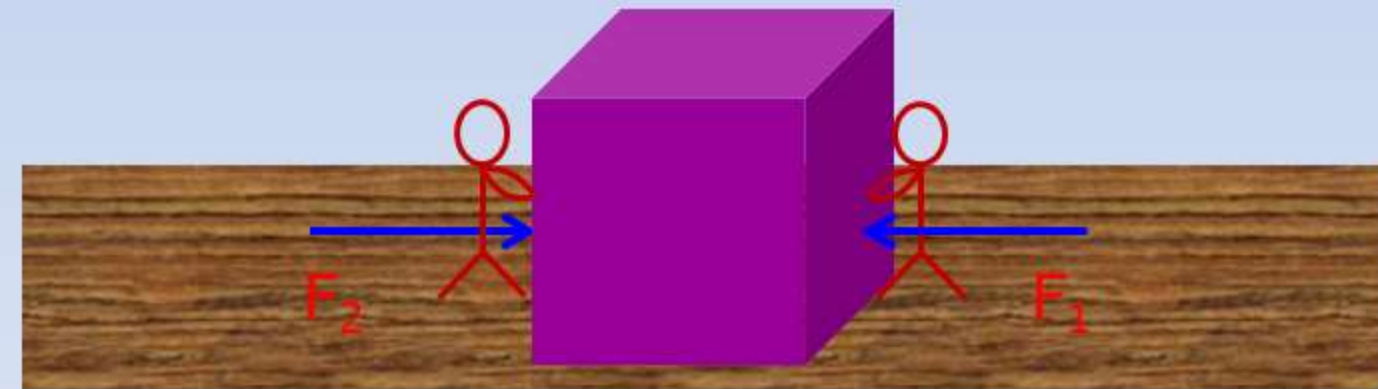
The **net force** acting on it is the **difference** between the **two forces**

Exploring Forces

- If both side forces are same then,
net force is **zero**
- If Right side force is more then, $F_1 > F_2$
net force is towards **left**
- If left side force is more then, $F_2 > F_1$
net force is towards **right**

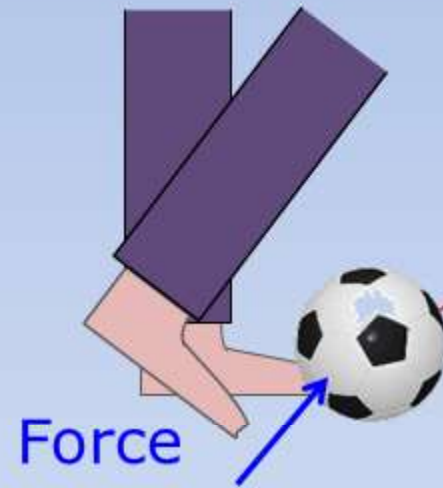
The **net force** is in the direction
which has **greater magnitude**.

If the direction **or** the magnitude of the **applied force** changes,
its **effect also changes**



A Force can Change the State of Motion

The ball is at **rest** (speed is **zero**)



The player applies a **force** on the ball,
the ball move **towards the goal**

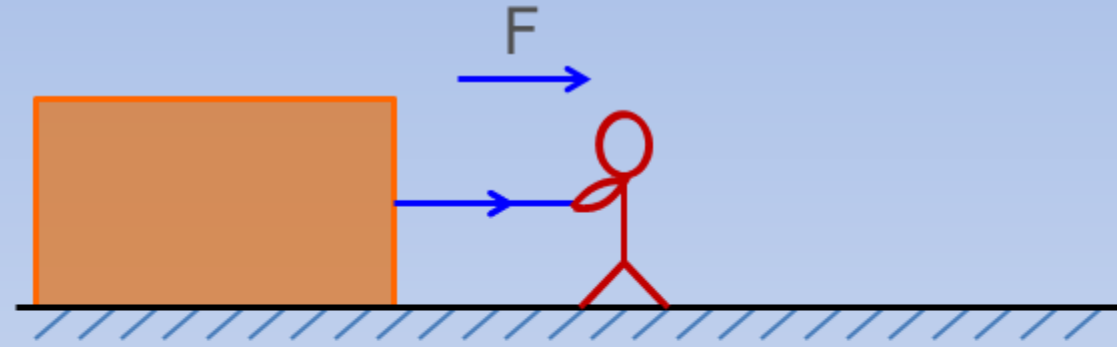
Ball acquires **speed**



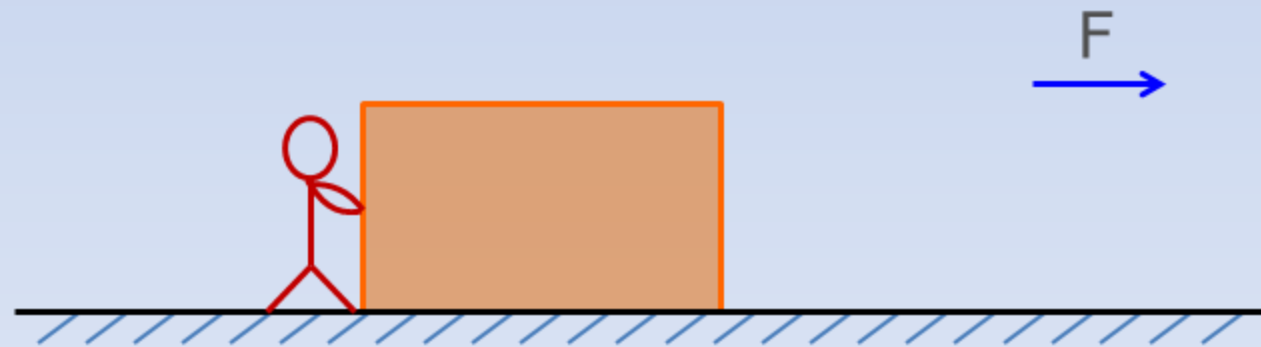
The goalkeeper **tries** to apply a force
on the **moving ball**

Ball speed **decreases** to **zero**

- A Force may make an object **move from rest**



- A Force may **change the speed** of an object if it is moving



- A Force may **change the direction** of **motion** of an object



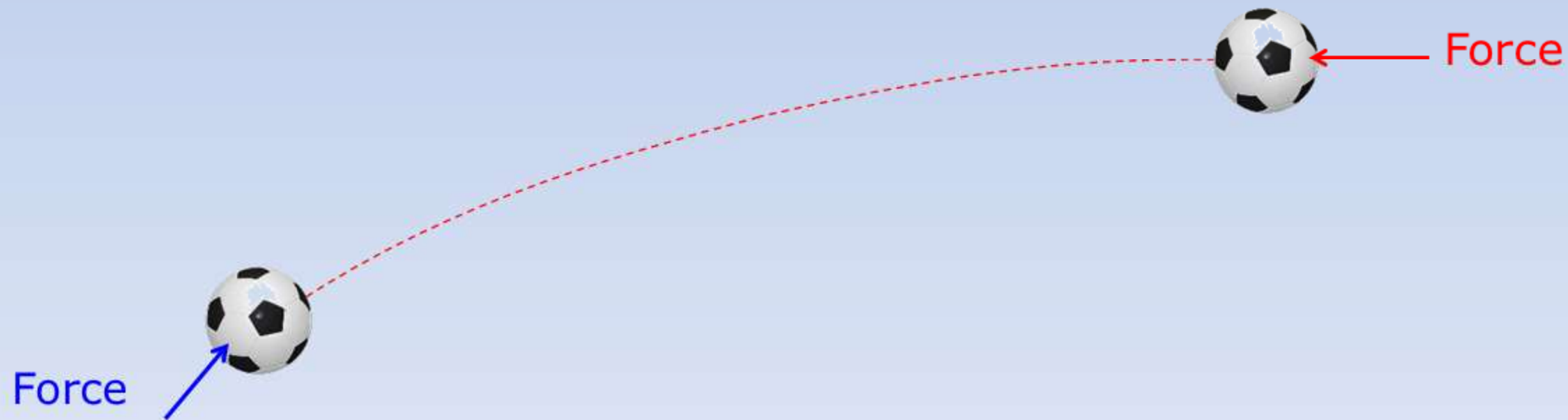
- A Force may bring about a **change in the shape** of an object



A Force can Change the State of Motion

A force applied on an object may **change its speed**

If the force applied on the object is **in the direction** of its motion,
the speed of the object **increases**



A Force can Change the State of Motion

If the force applied on the object **opposite to the direction** of its motion,
the speed of the object **decreases**



State of motion

An object may be at **rest** or in **motion** (**state of motion**)

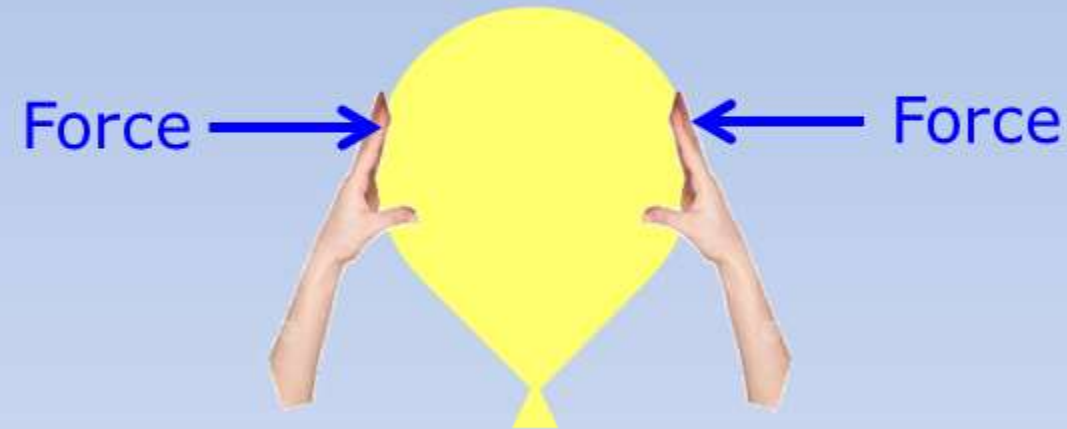
Change in state of motion

A **change in** either the **speed** of an object, **or its direction** of motion, **or both**

Force can Change the Shape of an Object

What happens when you apply a force on an inflated balloon by pressing it

between your palms?



Balloon **deforms**

Force on an object may **change its shape**

Contact Forces

Force can be applied only when **it is in contact** with an object, is called a **contact force**

Muscular Force

The force resulting due to the **action of muscles** is known as the **muscular force**

Example

Muscular force of animals is used to **carry out many tasks**



Contact Forces

Friction

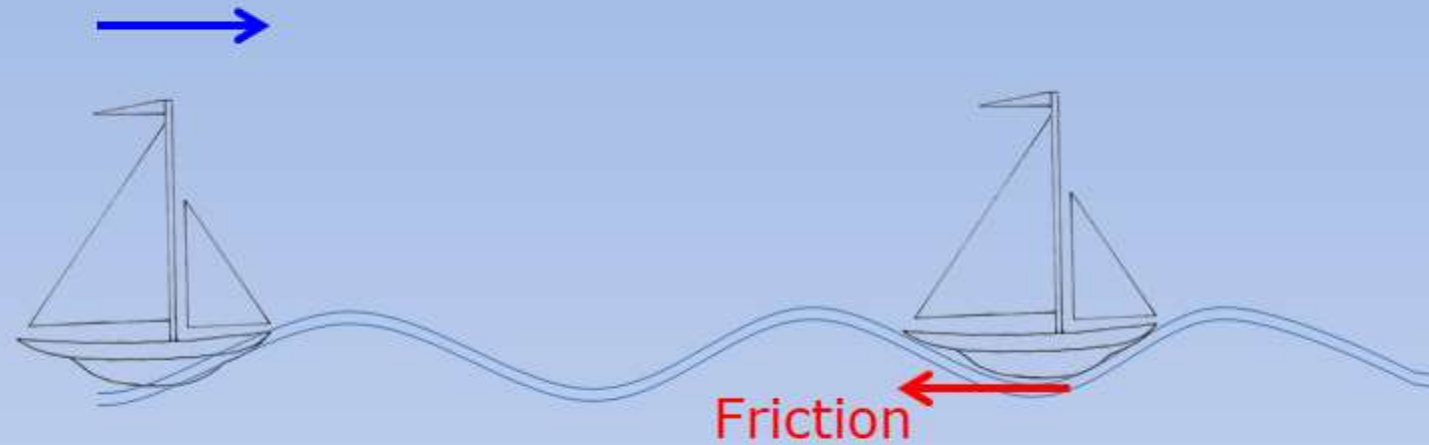
The force which **opposes** the **motion** of a object.

Example

A ball rolling along the ground gradually **slows down** and finally comes to **rest**



Force of friction between the **surface** of the **ball** and the **ground**



Force of Friction between **water** and the **boat**

- The force of friction acts on the **moving objects**
- Direction of the friction is always **opposite** to the **direction of the motion**

Non Contact Forces

Force which acts on an object **without physically in contact** with it

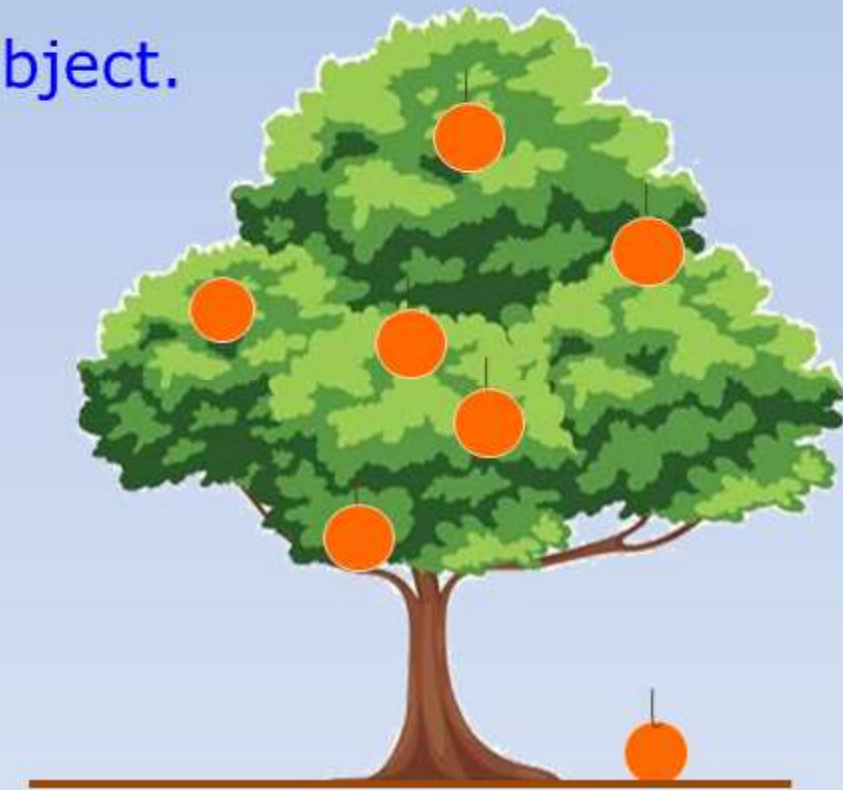
Gravitational Force

Every object in the universe **exerts a force** on every other object.

Example

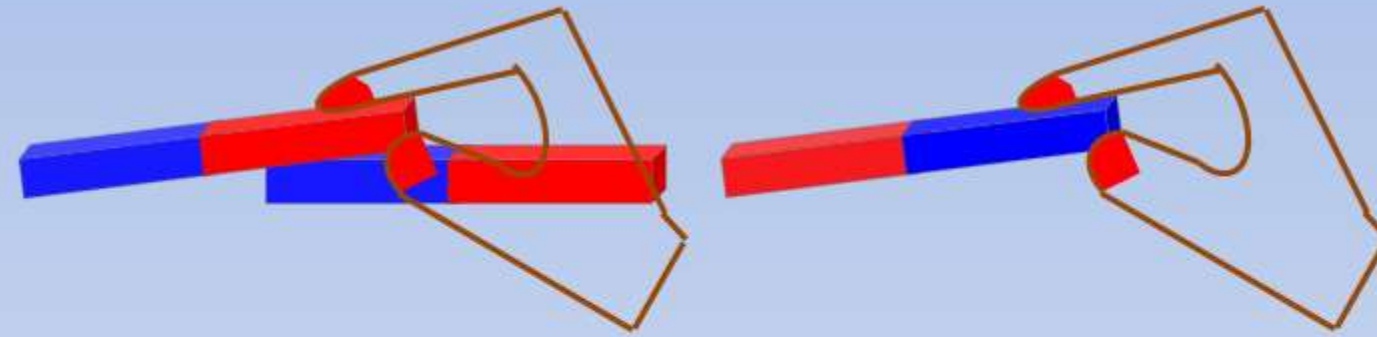
A **fruit** from a tree **falls down** to the ground

Gravitational force always an **attractive force**



Magnetic Force

Attraction **or** repulsion between magnets.



A magnet can **exert a force** on another magnet **without** being in contact with it

Non Contact Forces

Electrostatic Force

The force exerted by a charged body on another charged or uncharged body

is known as electrostatic force

Example

An electron revolves around the nucleus
(due to attractive force)

