

# 11

## Push and Pull

We'll cover the following key points:

- Push and Pull
- Types of forces



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### Learning Outcomes

**By the end of this chapter, students will be able to:**

- Understand the concept of push and pull forces and their role in motion.
- Explain the types of forces, including contact forces and non-contact forces, and their differences.
- Describe the effects of push and pull forces on objects, focusing on how they cause movement or changes in shape.
- Identify how different types of forces, such as friction and gravity, influence motion in everyday life.

### Guidelines for Teachers

The teacher can begin the chapter by explaining the basic concept of push and pull forces, emphasizing how these forces are responsible for moving objects or changing their direction. Use everyday examples like pushing a door to open it or pulling a cart to demonstrate these forces. Illustrate the types of forces—contact forces (such as friction, tension, and normal force) and non-contact forces (like gravity, magnetism, and electrostatic force)—with real-life examples. Engage students with simple experiments, such as observing the effect of pushing and pulling on various objects, to help them understand the principles of motion and force. Encourage discussions on how balanced and unbalanced forces impact the movement of objects.



## Warm Up

Experiential Learning

How will you do the following activities?

- a. move a chair forward \_\_\_\_\_
- b. move the chair backward \_\_\_\_\_
- c. move a football from a place in the field into the goal post \_\_\_\_\_

### Fun Fact



Magnets are fascinating examples of push and pull forces. Opposite poles attract each other, while like poles repel. This simple force is behind complex technologies like electric motors and even MRI machines, which help doctors see inside the human body. Magnets show us the power of invisible forces in our daily lives.

To open or close the door of your room, you pull or push it. Similarly, to move your table, chair or any other object from its position, you pull or push it. This pull or push is called force. Force plays an important role in our daily life. No work is possible without the application of force.

### Push and Pull

A push and a pull are opposite forces, meaning they move objects in different directions. We push or pull things around us to get different jobs done and while performing different activities.

A push is the force that moves an object away from something. While pushing an object we use our strength to move it forward. Even when we walk, we push ourselves against the ground to move.

#### Some examples of push are:

- ✦ Closing the door of the refrigerator after getting some snack.
- ✦ Kicking the football.
- ✦ Pushing the book while putting it back on the bookshelf.
- ✦ Rolling a large rock across the playground.
- ✦ Pushing the striker while playing carrom.



A pull is the force of bringing an object closer. While pulling an object you hold it and use your strength to move it towards you.

Some examples of pull are:

- ✦ Pulling your socks up while getting ready for school.
- ✦ Pulling the rope while playing tug of war with your friends.
- ✦ Opening the front door using the door handle.
- ✦ Running by taking a moving toy like the car on the floor.
- ✦ Moving the shopping cart down from the grocery store.

## Force

A force is a push or a pull of an object that causes the object to speed up, slow down, change shape or change direction, on which it is applied. In other words, a force is what causes an object to move.

**We use force to do the following things:**

- ✦ A force can move a body at rest. It can also increase the speed of a moving object. For example: when a football is kicked, it begins to move.
- ✦ A force can slow down a moving object. It can also stop the moving object. For example: When a goalkeeper catches a football, the ball stops.
- ✦ A force can change the direction of motion of a moving object. For example: when a cricket ball is hit with a bat, the ball changes its direction due to the force applied on it.
- ✦ A force can change the shape and size of an object. For example: when dough is rolled out to make chapatti, the force applied on the dough changes its shape and size.



Ball kicked by a boy



Boy hit the ball with the bat

Write 'T' for true and 'F' for false statements.

1. Push and pull are opposite forces.
2. A force causes an object to move.
3. Force cannot change the shape and size of an object.
4. Opening the door using the door handle is pushing.

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## Types of forces

The forces that we experience in our day to day life are of various types. Some of them are discussed here.

### Gravitational Force

Anything that is thrown up comes down. For example : if a ball is thrown upwards it comes down after some time. This happens due to a force called **gravity**. The force that pulls everything towards the centre of the Earth is called the **force of gravity** or gravity. Gravity is very important in our everyday lives. Without Earth's gravity we would fly right off our planet!



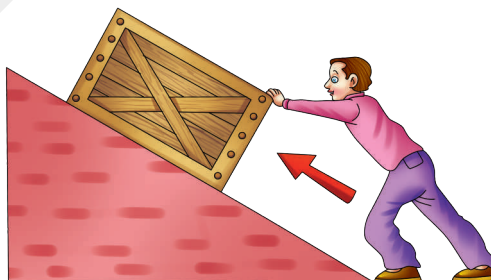
#### Did you know ?

On Earth, gravity keeps the air around us (and everything else) from drifting off into space. Gravity also causes hot air to rise while colder air falls (which in turn causes wind).

**Sir Isaac Newton** first wrote his theory about gravity after watching an apple fall to the ground.

### Frictional force

The force that acts whenever any two objects slide or come in contact with each other is called **frictional force or friction**. For example, when you try to push a book along the floor, friction makes this difficult.



#### Did you know ?

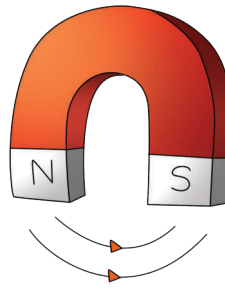
Rubbing hands together is one of the examples of friction. Our hands become warmer due to friction which generates the heat.

Friction always works in the direction opposite to the direction in which the object is moving, or trying to move. Friction always slows down a moving object or stops it from moving.

A rough surface causes more friction than a smooth surface. That is why a ball travels a shorter distance on a grass surface than on a tiled floor.

## Magnetic Force

A force that can attract (pull closer) or repel (push away) objects that have a magnetic material like iron and nickel inside them (magnetic objects) is called magnetic force. A magnet can also attract or repel another magnet with its magnetic force. A magnet has two poles: North Pole (marked as N) and South Pole (marked as S). Unlike poles attract each other whereas like poles repel each other.



### Did you know ?

Both gravitational force and magnetic force don't actually have to have contact between the objects, they act at a distance.

## Muscular Force

The force that is applied using parts of the body like arms or legs is called muscular force. It is the force that results due to the action of muscles and is a contact force, since there is a contact between the surfaces. Muscular force is needed whenever movement of the body occurs. Walking, lifting, running, standing, pushing, pulling and carrying things are different kinds of work that we do with the help of our muscles.



### Critical Thinking

### Check 'N' Mate

#### Fill in the blanks.

1. \_\_\_\_\_ (Gravity/Force) is very important in our everyday lives.
2. A \_\_\_\_\_ (smooth/rough) surface causes more friction.
3. Unlike poles \_\_\_\_\_ (attract/distract) each other.
4. \_\_\_\_\_ (Mental/Muscular) force is needed whenever movement of the body occurs.



### In a Nutshell

- ✦ † Force is a push or pull acting on an object.
- ✦ A push is the force that moves an object away from something. For example: kicking a football.
- ✦ A pull is the force of bringing an object closer. For example: opening the door by using the door handle.
- ✦ Force can move a stationary object, stop a moving object, change the direction of a moving object and change the speed and shape of an object.

- ✦ Force can be of various types- gravitational force, frictional force, magnetic force and muscular force.
- ✦ The force that pulls every object towards the centre of the Earth is called gravitational force.
- ✦ The force that acts whenever the two objects slide or come in contact with each other is called a frictional force.
- ✦ The force with which a magnet attracts certain metals such as iron and nickel towards itself is called magnetic force.
- ✦ The force exerted by our muscles to do certain work is called muscular force.

## Key Words

## Improving Vocabulary

Pull	: To draw objects towards oneself
Push	: To move a thing forward
Contact force	: A force applied to a body by another body that is in contact with it
Non contact force	: A force which acts on an object without coming physically in contact with it



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## EXERCISE

That turn curiosity into confidence—let's begin!



### A. Objective Type Questions.

- A push or pull that makes something move is called a \_\_\_\_\_.  
a. motion                      b. force                      c. path
- This kind of surface makes objects move slowly:  
a. Smooth                      b. Flat                      c. Rough
- A ball is lying on the floor. When will the ball move?  
a. When a force acts on it.  
b. When gravity pulls on it.  
c. When the lights are turned on.
- To move your books away from you, you should \_\_\_\_\_.  
a. push them                      b. pull them                      c. Both (a) and (b)

5. The direction of moving object can be changed by applying \_\_\_\_\_ .  
a. Gravity                                      b. Friction                                      c. Force
6. A ball thrown up falls back to the Earth due to \_\_\_\_\_ .  
a. Friction                                      b. Gravity                                      c. Weight

### B. Fill in the blanks :

1. A force is a \_\_\_\_\_ or a \_\_\_\_\_ .
2. The force of \_\_\_\_\_ pulls everything down.
3. A moving football comes to a stop after some time because of the force of \_\_\_\_\_ .
4. A magnet has two poles \_\_\_\_\_ and \_\_\_\_\_ .
5. \_\_\_\_\_ was the first person who discovered the force of gravity.
6. The force exerted by our muscles to do work is called \_\_\_\_\_ .

### C. Very Short Answer Questions.

**Write 'T' for true and 'F' for false statement. Also correct the wrong statements.**

1. Force cannot move a stationary object.
2. The force applied on clay by hands can change its shape.
3. Frictional force always acts in the direction opposite to the direction of the movement of the object.
4. Gravitational and magnetic force are examples of contact force.
5. Magnets attract metals made of iron and nickel.

### D. Short Answer Questions.

1. Write two examples each of push and pull.
2. Write the differences between push and pull.
3. Define force.
4. What is the importance of force in our day to day life?
5. Name the different types of force.



### E. Long Answer Questions.

1. What are the things that force can do? Explain with examples.
2. What are the differences between gravitational and frictional force?
3. Explain magnetic force.
4. What is muscular force? How is it helpful for us?

## Time to Apply

Applying and Creating

1. Identify the kind of force in the following:
  - a. A mango falls down from a tree.
  - b. Cranes lifting heavy objects made of iron.
  - c. We are able to walk on the ground without slipping.
  - d. Lighting of matchstick.
  - e. Pushing a shopping cart.
2. On her way back home, Akriti stepped on a banana peel near her house and lost her balance. Why did she lose her balance?



## Time to Discuss

Pondering and Communicating

What force is being applied for this action?



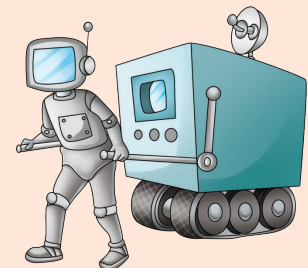
- a. Mechanical force      b. Gravitational force      c. Muscular force

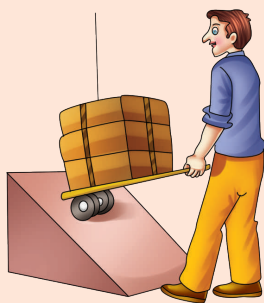


## Time to Observe

Observing, Critical Thinking, Analysing

Write Push or Pull for the following:





## Time to Recall

## Remembering and Analysing

Recall and complete the concept map given below.

### Types of forces





## Time to Create

## Creating and Collaborating

Take different types of balls, varying in size and weight. Find out if the weight of an objects affects the amount of force needed to move it by a certain distance.