

Position, Direction, and Speed

Key Words • position • distance • motion • direction • speed

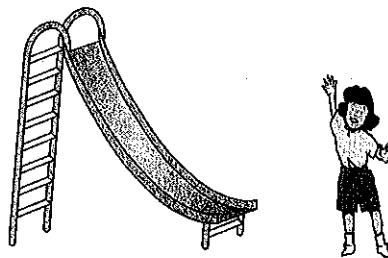


Getting the Idea

Where are you right now? You are probably in your classroom. You may be sitting at your desk. You may be at the front of the room, at the back, or in the middle. You may be to the right of one classmate and to the left of another. There are many ways to describe where you are.

Position

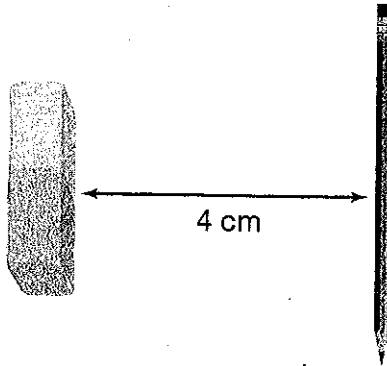
Position is the place where something is. You can describe an object's position by saying where it is compared to something else. Look at the picture of the girl and the slide. You can describe the position of the girl in different ways. You can say, "The girl is next to the slide." Or you can say, "The girl is to the right of the slide." You also can describe the position of the slide. You can say, "The slide is to the left of the girl."



The chart lists some ways to describe position. You can use those words and others to tell where something is.

Words and Phrases That Describe Position	
Above, on top of	Below, underneath
Inside	Outside
In front of	In back of, behind
To the right of	To the left of
Next to	Beside

You can measure to help you describe position. Look at the picture below. You can say, "The eraser is four centimeters to the left of the pencil." You can also say, "The pencil is four centimeters to the right of the pencil."



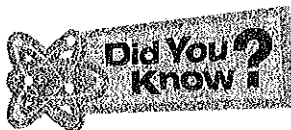
Distance

You have learned to measure length. **Distance** is the length between two places or objects. It tells how far away one thing is from another. Remember that you can use a meter stick, meter tape, and ruler to measure length. You can use these tools to measure distance, too. These tools measure in centimeters (cm) or meters (m). You can use these tools to make sure that the distance between the pencil and eraser above is four centimeters.

Motion

When something moves, its position changes. **Motion** is a change in an object's position. An object stays in motion as long as its position keeps changing.

Think about riding in a car. The car is in motion as long as it keeps moving along the road. The car's position changes as you ride along. Now suppose you stop at a red light. The car is no longer in motion. Its position does not change while you are stopped at the light.



When you ride in a car, you may feel as though you are standing still. You feel that way because you and the car move together. Your position does not change compared with the car's position.

Direction is the path an object in motion follows. Suppose you want to describe an object's motion. You need to know how far the object moves. You also need to know which direction it moves in. Here are some ways to describe direction.

Words and Phrases That Describe Direction	
Up	Down
Left	Right
Forward	Backward
Toward	Away from
Around	Through
Into	Out of
North, south	East, west

Speed

How fast do you go when you ride your bicycle? How fast does a car go? **Speed** is how fast an object moves. Speed is also how far something moves in a certain amount of time.

You can use speed and direction to describe an object's motion and to compare the motion of different objects. Say two students run away from a fence for one minute. The student who is faster moves a greater distance from the fence in one minute than the student who is slower. The student who moves a greater distance in the same amount of time has the greater speed.

Discussion Question

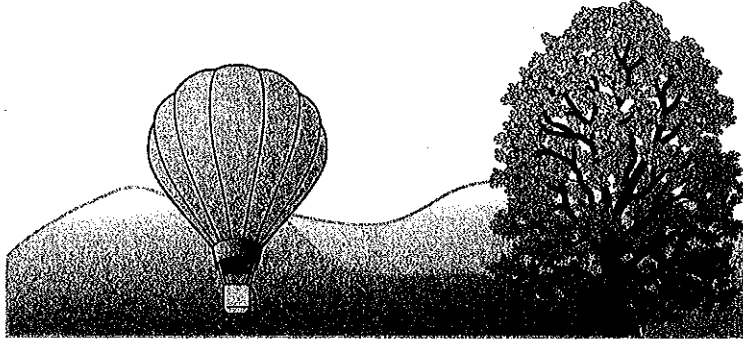
Suppose you roll a ball along the ground. How can you describe its motion? Give an example.



Lesson Review

- Which one is NOT a word you would use to describe position?
 - above
 - inside
 - underneath
 - fast

2. Look at the picture below.



Which sentence BEST describes the position of the tree?

- A. It is above the balloon.
 - B. It is underneath the balloon.
 - C. It is to the right of the balloon.
 - D. It is behind the balloon.
3. What is motion?
- A. a change in an object's position
 - B. the place where an object is located
 - C. how far an object moves
 - D. the direction an object moves in
4. A student who says he is running east is describing his
- A. direction.
 - B. position.
 - C. distance.
 - D. speed.
5. What is speed?
- A. how far an object moves
 - B. how fast an object moves
 - C. the path an object in motion follows
 - D. how much an object warms up

Pushes and Pulls Change Motion

Key Word • gravity

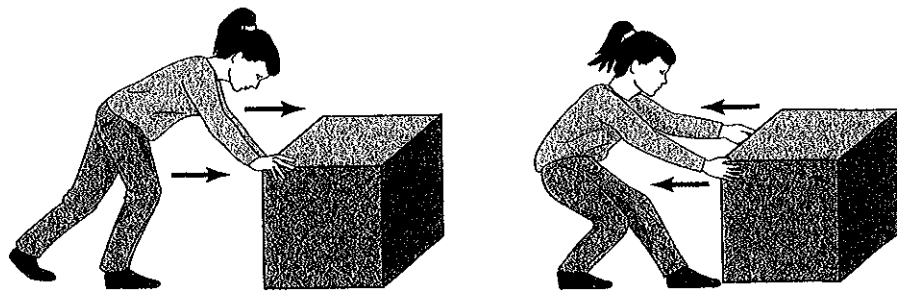


Getting the Idea

In Lesson 27, you learned about motion. You move all the time. You might walk, run, jump, roll, and fall. Many objects around you also move. But what is it that makes things move? In this lesson, you will learn what makes an object move.

Changing Motion

A push or pull can make an object start moving. You push a shopping cart to make it move through a store. You pull a wagon or a sled. You push or pull a door to open or close it. When you walk or run, you push your feet against the ground to move your body forward. When you kick a ball, your foot pushes the ball away from you. Look at the pictures below. The girl is pushing or pulling to change the position of the box.



A little push can make an object move. A stronger push makes it move faster. Once an object is moving, a push or a pull can change the object's motion. How much the motion of an object changes depends on how hard you push or pull. Bigger changes happen with harder pushes and pulls.

A push or pull can change the direction in which an object is moving. Suppose a soccer ball is rolling toward you. You can kick it back the other way. You can also kick it to the right or the left.

A push or pull can also change an object's speed, or how fast it moves. The speed of motion depends on how strong the push or pull is. When you ride a skateboard, pushing harder on the ground makes the skateboard go faster. The harder you push or pull an object, the faster it moves.

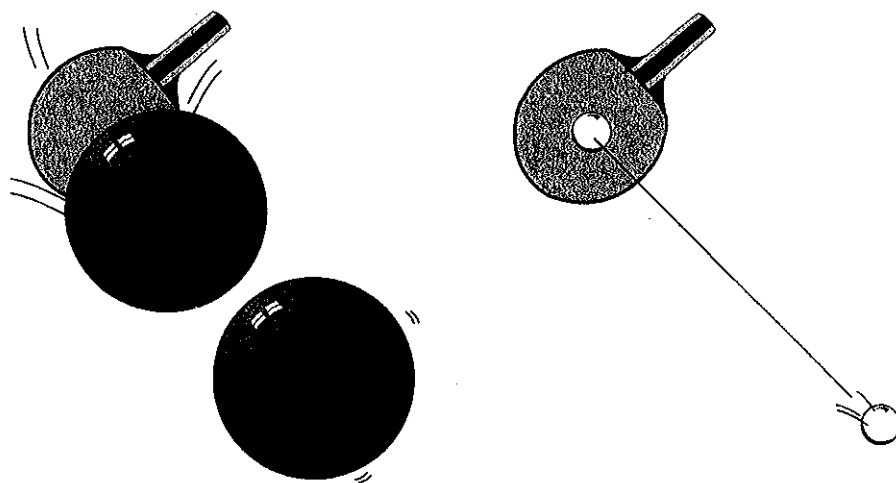
A push or pull can stop an object's motion. If you push your foot hard against the ground, your skateboard will stop. When a shopping cart rolls away, you can stop it by pulling on the handle.

Mass and Motion

Remember that mass is the amount of matter in an object. An object with a large mass is hard to move. You need to push or pull hard to make the object move. An object with less mass is easier to move. A weaker push or pull can move the object.

Think about two objects with different masses. You push on each object with the same strength. The object with less mass will move faster and farther.

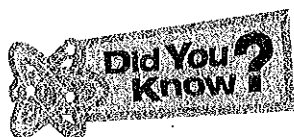
Say you use a Ping-Pong paddle to hit a bowling ball and then a Ping-Pong ball. The mass of the bowling ball is greater than the mass of the Ping-Pong ball. If the paddle hits both balls with the same strength, the Ping-Pong ball will move faster. It also will move a greater distance.



Gravity

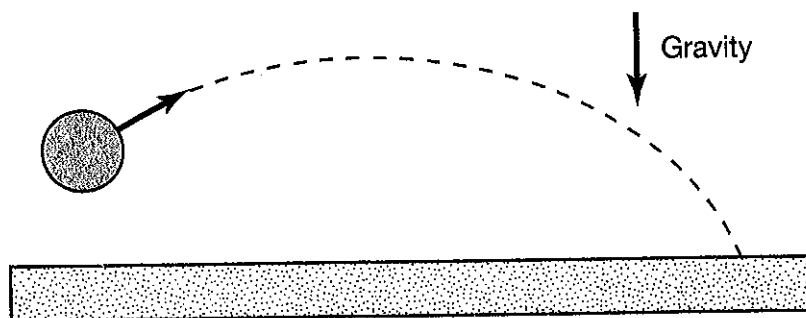
Gravity is the pull of objects toward each other. The pull of gravity is everywhere. Objects do not have to touch to pull on each other. Your desk pulls on your chair, and your chair pulls on your desk. Your body pulls on a tree, and a tree pulls on your body. Any object you see pulls on the objects around it.

We do not notice the pull of small objects on each other. But we do notice the pull of Earth's gravity. Earth's gravity pulls everything toward Earth's center. That is why objects like balls, raindrops, and people fall to the ground. If you jump up in the air, gravity pulls you back to Earth. When you let go of a ball, gravity pulls it down to the ground. Of course, gravity cannot pull the ball all the way to the center of Earth. But gravity pulls the ball in that direction.



Water always flows downward. That is because gravity pulls it down toward the center of Earth.

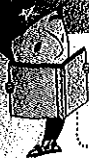
Gravity pulls on objects that you drop. It pulls on objects you throw, too. When you throw a ball up and away from you, gravity pulls it back down in a curved path.



Earth's gravity does not just make objects fall. It holds them down, too. Earth's gravity keeps objects on Earth. It stops you and other objects from floating off into space.

Discussion Question

You kick a ball, and the ball moves down the field. While it is moving, you kick it again, even harder, in the same direction. How will the ball's motion change?



Lesson Review

1. What makes an object start moving?
 - A. motion
 - B. speed
 - C. mass
 - D. a push or pull
2. When you push a shopping cart, you
 - A. change its motion.
 - B. do not change its position.
 - C. change the mass of the cart.
 - D. change your own mass.
3. What is gravity?
 - A. the pull of objects toward each other
 - B. the push of objects away from each other
 - C. a measure of how big an object is
 - D. the pull of objects that rub together
4. What causes an object to fall to Earth?
 - A. motion
 - B. gravity
 - C. mass
 - D. speed