

THINGS MOVE

A Science A-Z Physical Series

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**THINGS
MOVE**

Written by Rhonda Lucas Donald

www.sciencea-z.com

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KEY ELEMENTS USED IN THIS BOOK

The Big Idea: The world around us is in motion, full of living and nonliving things that move in ways that can be predicted and described. Pushing, pulling, friction, and gravity are all forces that affect objects. These forces can make things move, change their speed, change their direction, and stop them. Much of daily life depends on motion. We have to judge the amount of force to use when causing things to move, stop, or change direction. Knowing how and why things move allows us to work, play, get around, and complete everyday tasks.

Key words: bounce, direction, down, energy, fall, fast, force, friction, gravity, heavy, kick, light, motion, motor, move, pull, push, rest, roll, slow, speed, start, stop, swing, throw, turn, up, weight, wheel

Key comprehension skill: Cause and effect

Other suitable comprehension skills: Compare and contrast; classify information; main idea and details; identify facts; elements of a genre

Key reading strategy: Summarize

Other suitable reading strategies: Connect to prior knowledge; ask and answer questions; visualize; retell; using a table of contents and headings; using a glossary and boldfaced terms

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Things Move

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Introduction

All around you, things move in many ways. Cars roll, birds fly, balls bounce, and children run. Some things seem to move on their own, while other things have to be moved.

Some things **move** quickly, and some things move slowly. Some things move in a straight line, and others move in a circle. Many things change **direction** as they move.





You can see that things move in many different ways. Let's learn why things move. Let's also learn what makes them move in different ways.

At Rest or in Motion?

Look at the two pictures. How are the cars in one picture different from the cars in the other picture?

The cars sitting in the parking lot are at rest. The cars on the road are in **motion**. What makes some cars move while others stay at rest?





Objects can't move on their own. They stay at rest until a **force** moves them. That force can come from a living or a nonliving thing. The sled above moves when the child *pulls* on it. The child could also get behind the sled and *push* it. Pushing and pulling are two kinds of forces.

Before you can kick a ball to make it move, you need **energy**. You get energy from the food you eat. Making a force requires energy.



It also takes a force to make a car move. So a car needs energy, too. But the person driving it does not have to push the car. The car has a motor that gets energy from the gas it burns. The motor uses this energy to



make a force that turns the wheels. Then the car moves.



Push and Pull

Forces can make things move in different directions. If you push a toy car, it rolls away from you. If you pull the car, it rolls toward you. If you push or pull on the side of a ball rolling in a straight line, it will change direction. A force can even stop things that are moving. Think about how many things you can move by pushing or pulling on them.



Pushing or pulling something that has a small amount of **weight** is easy. It takes very little force. It takes more force to move heavy objects than it does to move light objects.

Pushing an empty swing takes very little force. It takes more force to move a swing with someone on it.





Fast, Slow, and Direction

Speed is how fast or slow an object moves. You can make something move faster by using more force on it. The boats in the top picture are moving fast because the people are paddling harder. They could also turn the boats, make them slow down, or even stop them by using force in a different direction than the boats are moving.

The direction of motion can be described in many ways. A car can move up or down a hill. It can go in a circle. It can even zigzag. What words would you use to describe how things in the pictures are moving?



Starting and Stopping

Once a force gets something moving, that thing will continue to move until something stops it. If you are riding in a car, both you and the car are moving. You both move at the same speed. But if the car comes to a quick stop, you will keep moving until something stops you. You will move forward even though the car stops.



Seat belts and car seats keep you safe when a car stops.

Friction

When two things rub against each other, there is **friction**. Smooth objects usually have less friction, and rough objects usually have more. Friction is a force that slows things down. A car has a harder time stopping on a smooth, icy road than on a rough road because there is *little* friction on ice. It would be harder to snowboard on grass than on snow because there would be *too much* friction.



Even air can cause friction. Air helps to slow down a rolling marble.

Gravity

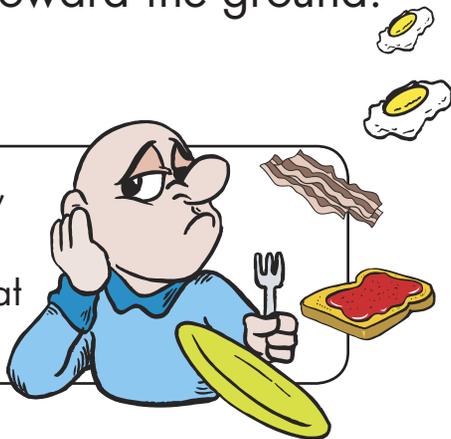
Some forces can move things without touching them. **Gravity** causes motion by pulling everything toward Earth's center.



When you drop something, you know it will fall to the ground. Gravity is what causes the motion of an apple falling from a tree. It is also what causes you to go down a slide. Gravity pulls a ball that is tossed into the air back toward the ground.

Do You Know?

Without gravity, everything on Earth would float off into space!



Conclusion

You have learned that different kinds of force make things move in many ways. Knowing about forces and motion helps you predict how things will move. When you throw a ball, you know that it will move in the direction of your throw. It won't loop in circles or zigzag. And it will come to a stop when someone catches it. Knowing how things move helps us get where we're going, do our work, and have fun.



Glossary

direction	the place toward which something is moving or facing (p. 4)
energy	the power to do work, make a change, or move objects (p. 8)
force	the strength or energy that moves an object (p. 7)
friction	the force that builds up when two objects rub against each other (p. 14)
gravity	the force that pulls things toward the center of Earth (p. 15)
motion	the act of going from one place to another (p. 6)
move	to go from one place to another (p. 4)
speed	how fast something is moving (p. 11)
weight	how heavy something is (p. 10)