

FOUNDATIONS OF PHYSICS

FORCE AND MOTION



TABLE OF CONTENTS

CHAPTER 1

What Is Force?..... 4

CHAPTER 2

Kinds of Forces..... 6

CHAPTER 3

Laws of Motion..... 14

ACTIVITIES & TOOLS

Try This!..... 22

Glossary..... 23

Index..... 24

To Learn More..... 24



CHAPTER 1

WHAT IS FORCE?

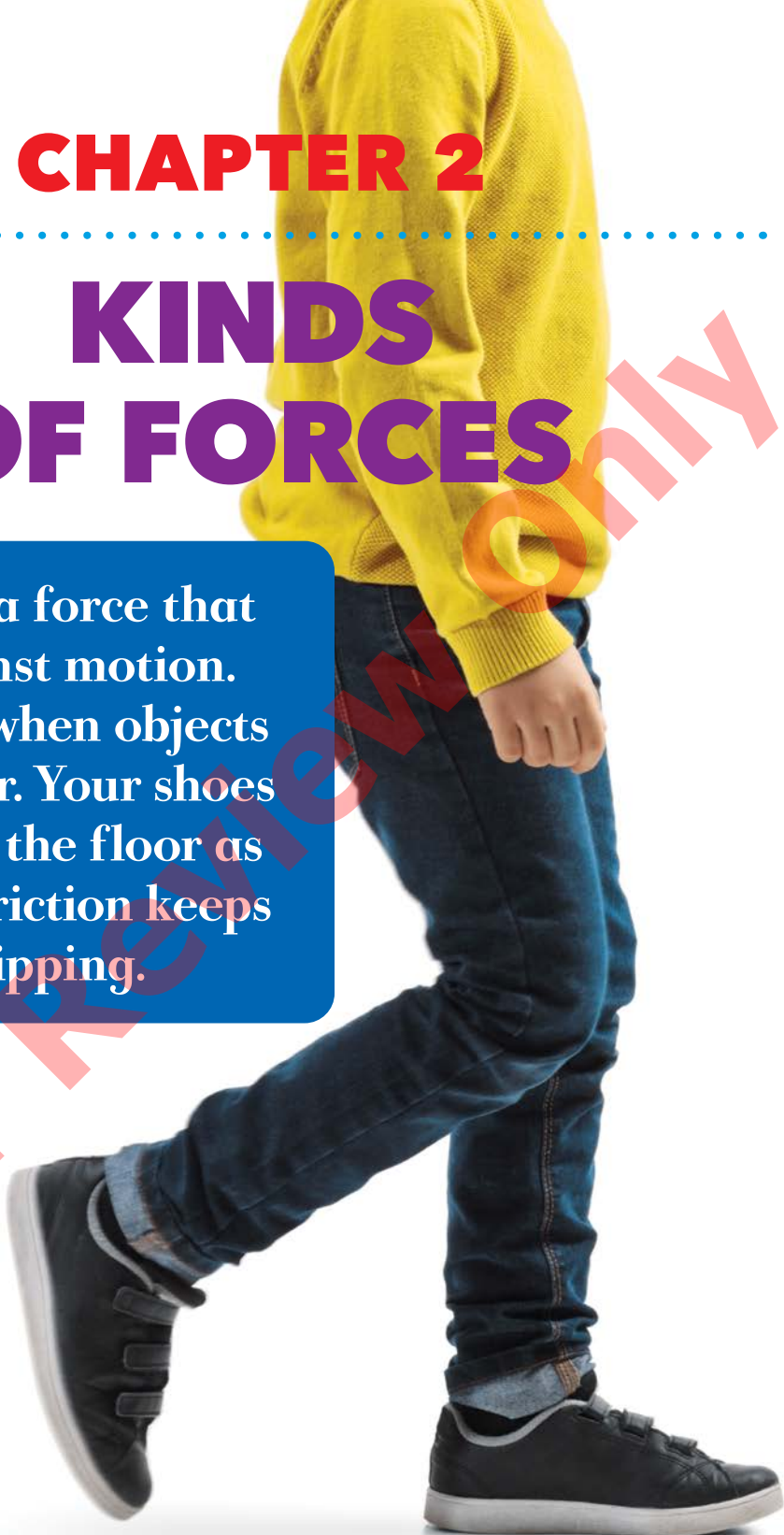
You shovel sand at the beach. Seagulls fly in the sky. Waves splash at your feet. **Motion** is a part of everyday life.



Force causes motion. A force is a push or pull. Forces are everywhere. The wind pushes clouds. You pull a wagon.



CHAPTER 2



KINDS OF FORCES

Friction is a force that works against motion. It happens when objects rub together. Your shoes rub against the floor as you walk. Friction keeps you from slipping.

Torque is the force that turns objects. You use torque to turn a doorknob. **Tension** is a force that tightens. A rope has it when it is pulled. A dog pulling on a leash is one example.



Gravity is the force that pulls objects toward Earth. Gravity gives objects weight. It brings you back down when you jump in the air. Without it, you would float into outer space!

DID YOU KNOW?

Sir Isaac Newton studied gravity in the 1600s. His Law of Universal Gravitation says that gravity acts between any two objects that have **mass**. The more mass an object has, the greater the force of gravity.





ACTIVITIES & TOOLS

TRY THIS!

TEST INERTIA

See how inertia works with this fun activity!

What You Need:

- chalk or tape
- a flat surface, such as a wooden floor
- a ruler
- quarters

- 1 Mark a spot on the flat surface with chalk or tape. This is your starting point.
- 2 Measure a spot 6 inches (15 centimeters) away. Mark it. This is your strike point. Make sure there is plenty of space after this point.
- 3 Stack all the quarters except one on the strike point. Make sure the edges of the quarters are even.
- 4 Place the last quarter on the starting point. Using your fingers, flick the quarter. It should slide and hit the bottom quarter in the stack on the strike point. This may take a few tries. Watch what happens. Do all quarters move or just the bottom quarter?
- 5 Repeat Step 3 with the remaining quarters.
- 6 Repeat Step 4. Now which quarters move? Why do you think this happens? Keep repeating until only one quarter is left on the strike point.

