



TWO COMMON Forces

What do the skydivers and some of the flower petals have in common? They are both falling! What causes this?

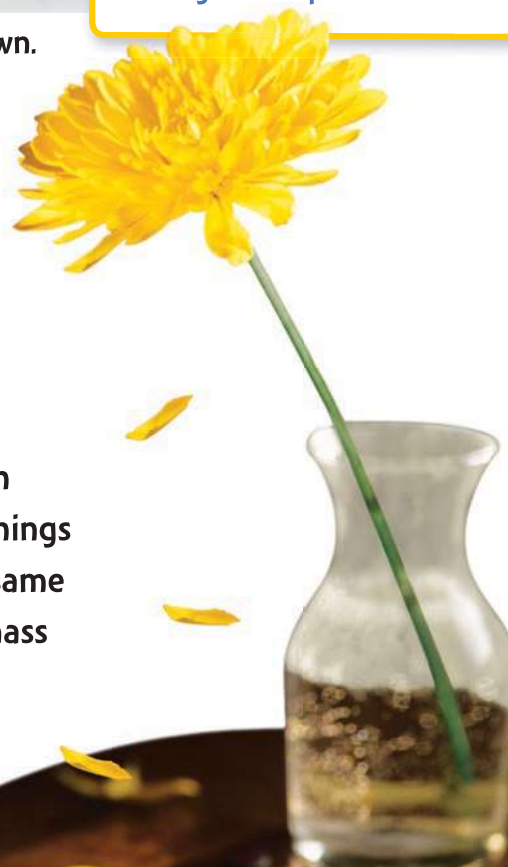
Active Reading As you read these pages, circle the sentence that describes a force that causes things to slow down.

► Draw an arrow showing the direction of the gravitational force between Earth and the falling flower petals.

→ Gravity

Gravity is a force of attraction between two objects. The size of this force increases as the mass of the objects increases. It decreases as the distance between the objects increases. Gravity acts on objects even if they are not touching.

Large objects such as Earth cause smaller objects, such as the skydivers, to accelerate quickly. We expect to see things fall toward Earth. However, the force of attraction is the same on both objects. If you place two objects with the same mass in outer space, they will move toward one another. If one object is “above” the other, the bottom object will appear to “fall up” as the other “falls down”!



Friction changes the energy of motion into thermal energy. When you use sandpaper to smooth wood, you can feel the temperature rise.



→ Friction

Is it easier to ride your bike on a smooth road or on a muddy trail? Why?

Friction is a force that opposes motion. Friction acts between two objects that are touching, such as the bike tires and the road. Friction can also exist between air and a moving object. This is called air resistance.

It is easy to slide across smooth ice because it doesn't have much friction. Pulling something across rough sandpaper is a lot harder because there is lots of friction.



An air hockey table blows air upward. This layer of air reduces the surface friction, so the pieces move quickly.

► In the pictures on this page, circle the places where there is friction between two objects. In the small boxes, write *Inc* if the object is designed to increase friction and *Dec* if the object is designed to decrease friction.

The tires on this bike are designed to keep the rider from slipping. You have to pedal harder on a rough surface to overcome the force of friction.

