

## Types of forces

### Changing shape

When a ball hits the floor the ball **deforms**. Forces can **compress** (squash) or **stretch** objects. When you exert a force you can deform an object. You can compress it or you can stretch it.

#### Quick question

Describe what happens to a tennis ball when it hits the ground

### How can the floor push you up?

The floor is a solid; solids are made up of particles arranged in a regular pattern. The particles are joined strongly together by bonds. When you stand on the floor your weight pushes the particles together. The bonds are then compressed and push back. This 'push back' supports you.

### Stretching

Bungee cords, springs, and even lift cables all stretch when you exert a force on them. The amount that they stretch is called the **extension**.

Springs are special. If you *double* the force on the spring the extension will *double*. If the extension doubles when you double the force then the object obeys **Hooke's Law**. The graph of force against extension is a straight line, or **linear**. Hooke's Law is a special case. Not everything behaves like a spring when you stretch it. If you double the force on an elastic band the extension may not double.

#### Quick question

State Hooke's Law.

### What is friction?

When a book is resting on the table you can push on it but it may not move. **Friction** grips objects. As you increase the force by pushing harder the book will start to move. If you remove the force the book slows down and stops. This is because the rough surfaces can no longer move past each other.

#### Quick question

State two things that friction does.

## What are drag forces?

A dolphin swimming through the water and a surfer paddling through water will both experience **water resistance**. As a snowboarder jumps through the air he will experience **air resistance**. Water resistance and air resistance are **drag forces**. To understand drag forces you need to think about the particles in the air and the water.



A solid moves through a gas.

A solid moves through a liquid.

As a dolphin moves through the water it pushes the water particles out of the way. This produces a drag force, which slows it down.

### Quick question

Name the drag force acting on an aeroplane in flight.