Science Lesson 1

Balanced and Unbalanced Forces

Aim

LO: To identify forces acting on objects.

Success Criteria

- I can identify forces as pushes and pulls.
- I can identify and explain the different forces acting on objects.
- I can identify and explain balanced and unbalanced forces.

What Are Forces?

Forces are often referred to as **pushes** and **pulls**.

Have a look at the pictures below and talk to your partner about whether each picture shows an example of a pushing or pulling force.

What Are Forces?

Forces affect the movement or shape of an object. They can make an object start to move, move faster, stop moving or move more slowly. They could also cause a moving object to change direction or make an object change its shape.

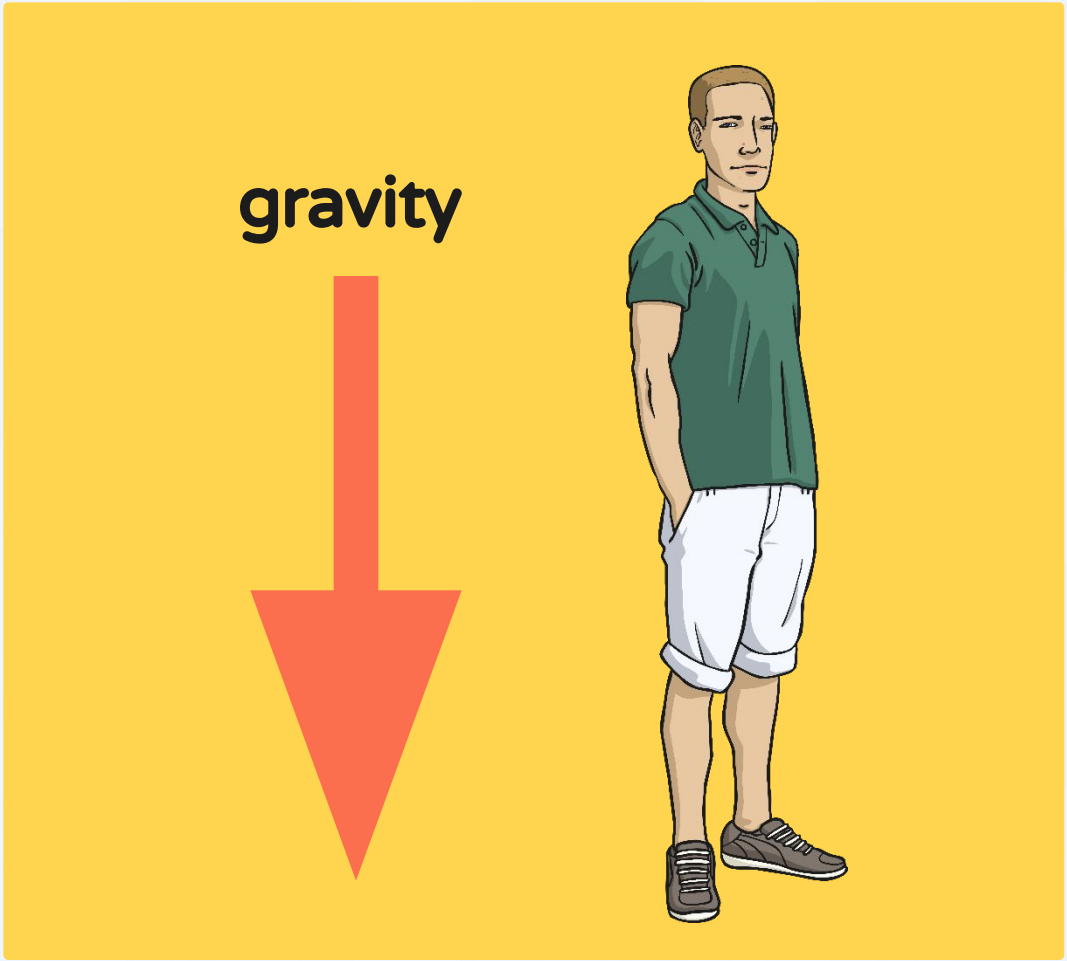
Even when an object is stationary (not moving), there are forces acting on it.

What is the name of the force pulling the boy down?

What Are Forces?

Gravity is a **pulling** force exerted by the Earth. The gravitational force pulls in the direction towards the centre of the Earth.

As the boy stands still, gravity is pulling him down towards the centre of the Earth.

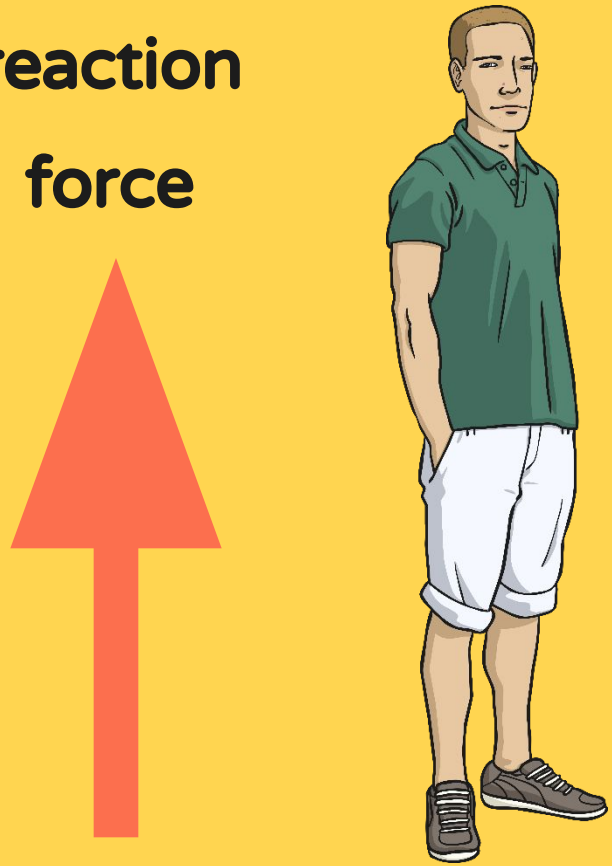


What Are Forces?

But of course, he isn't actually pulled to the centre of the Earth!

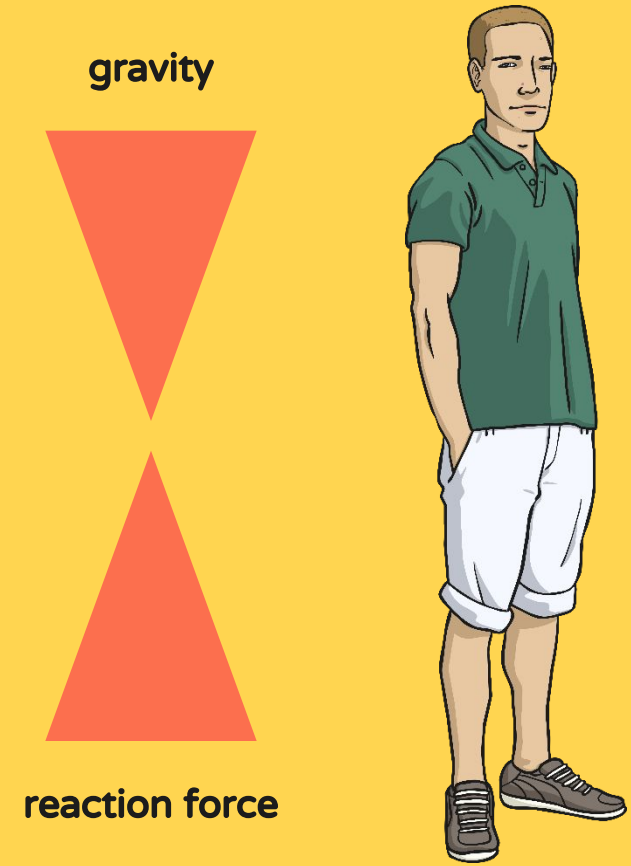
There is an **opposing** force pushing him back.

This force is exerted by the ground, and it is called the **reaction force**.



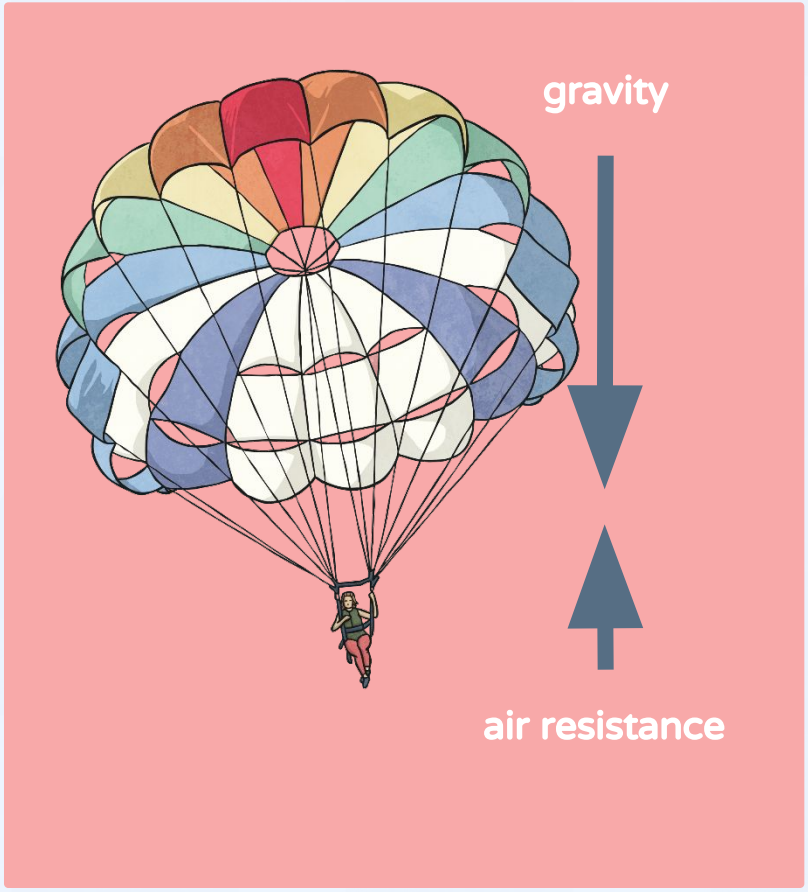
What Are Forces?

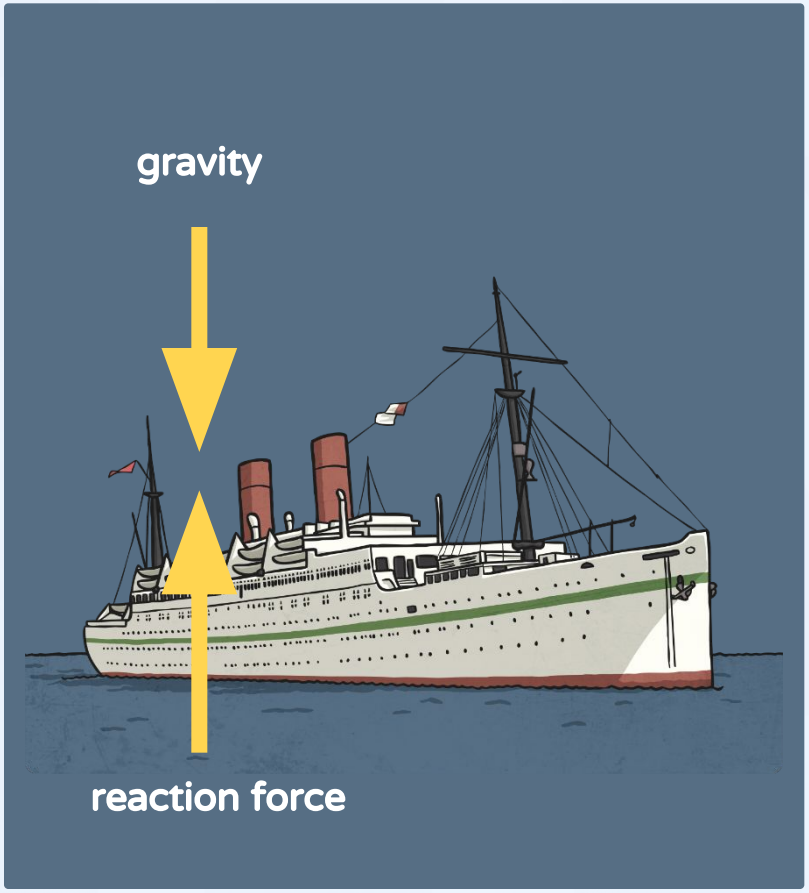
These forces are **equal**, or **balanced**. The **reaction force** from the ground is the same strength as the force of **gravity** pulling him down. This means that the boy stays still.



What Are Forces?

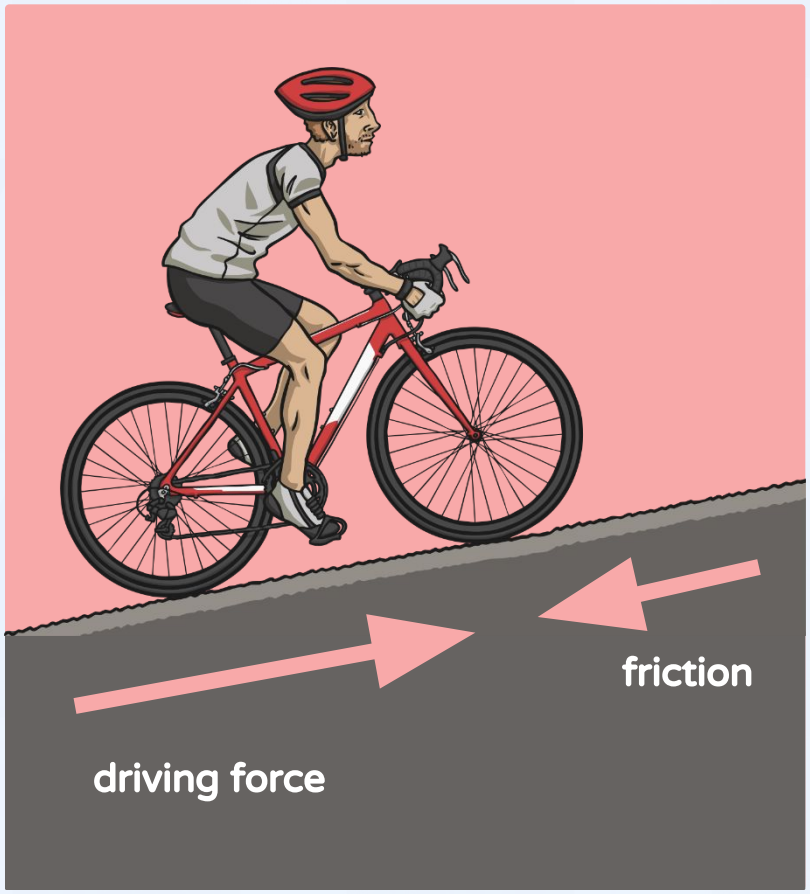
There are other forces that can act on objects as well as gravity.

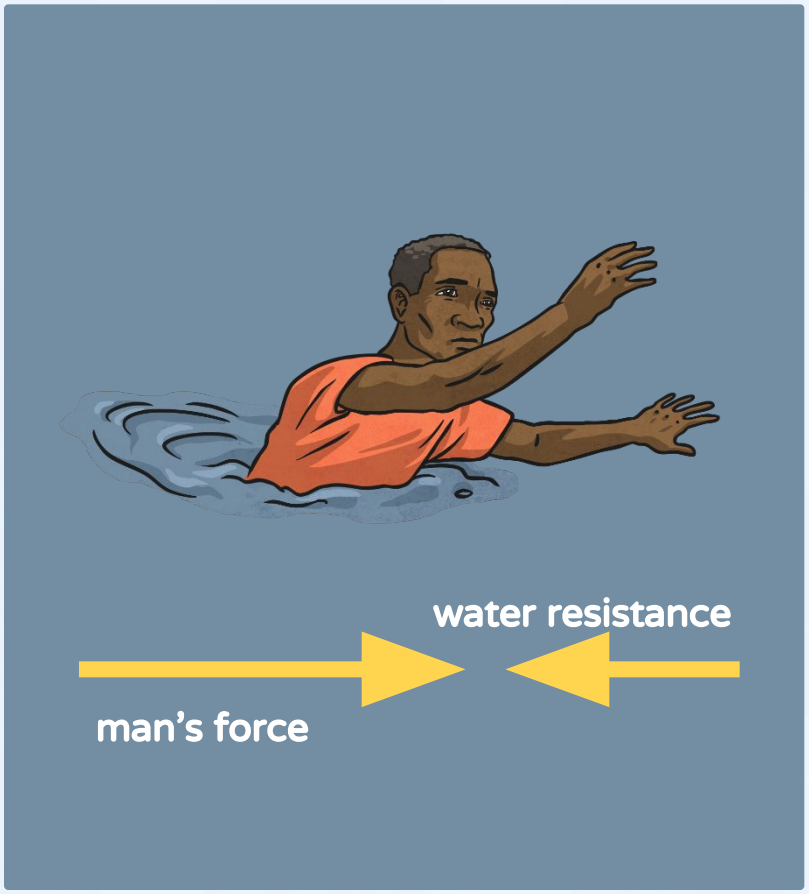




What Are Forces?

There are other forces that can act on objects as well as gravity.

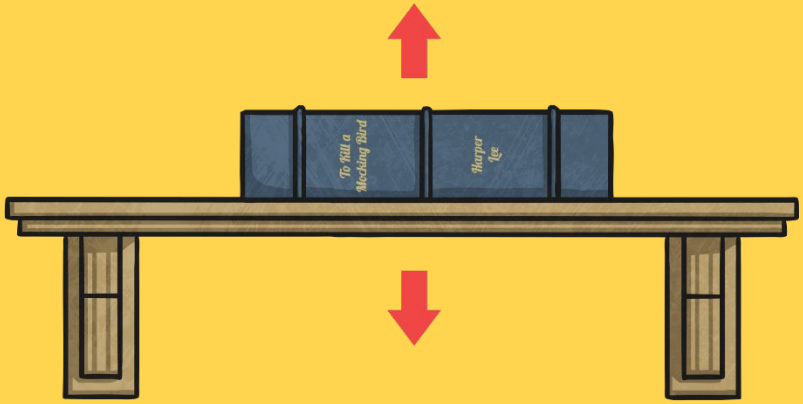




Balanced and Unbalanced

The forces acting on an object can be **balanced**. If the forces pushing and pulling an object are the same strength, they are **balanced**. Look at the books on this shelf. There are two forces acting on the books: **gravity** is pulling them down and the **reaction force** of the shelf is pushing them up. The arrows show the direction of the forces, and the relative size of the forces. The bigger the arrow, the bigger the force.

The reaction force of the shelf pushes upward on the books.



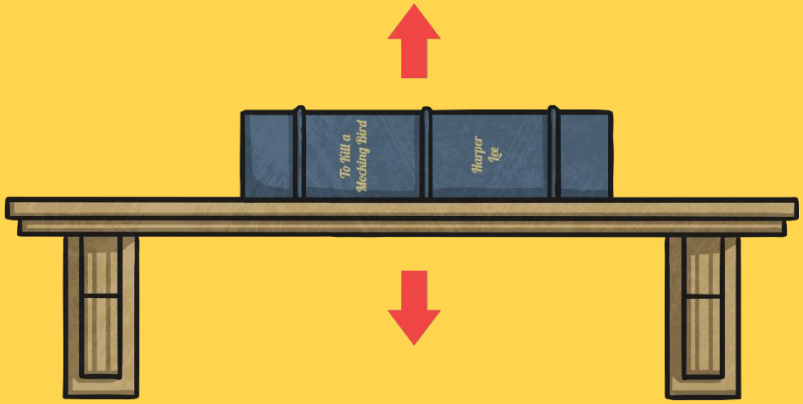
Gravity pulls downward on the books.

Balanced and Unbalanced

The two forces are **balanced** because they are of **equal** size and strength.

When the forces acting on an object are balanced, the object will maintain its state of motion - this means it will not start or stop moving, speed up or slow down. In this case, the books will stay still and not move up or down.

The reaction force of the shelf pushes upward on the books.



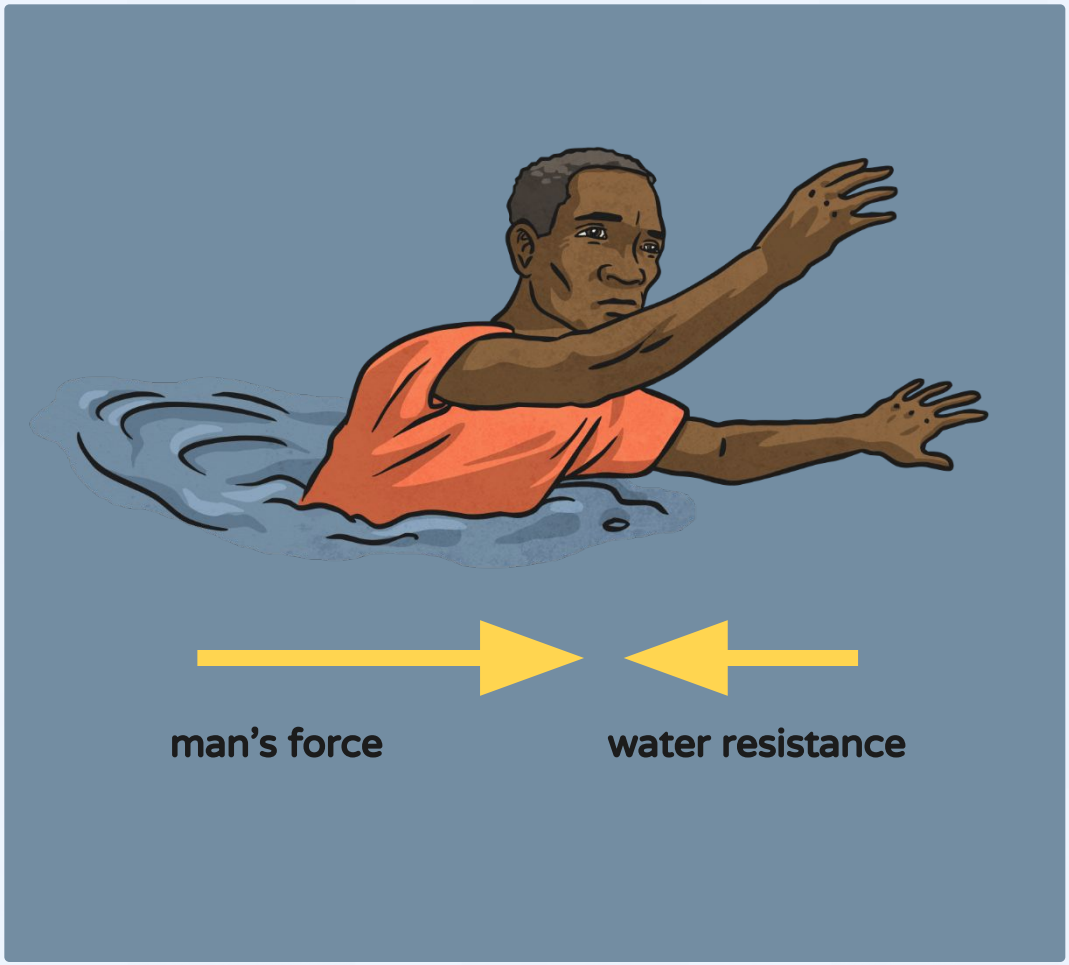
Gravity pulls downward on the books.

Balanced and Unbalanced

Unbalanced forces do **change** the way an object is moving.

Look at this example of a man walking through water.

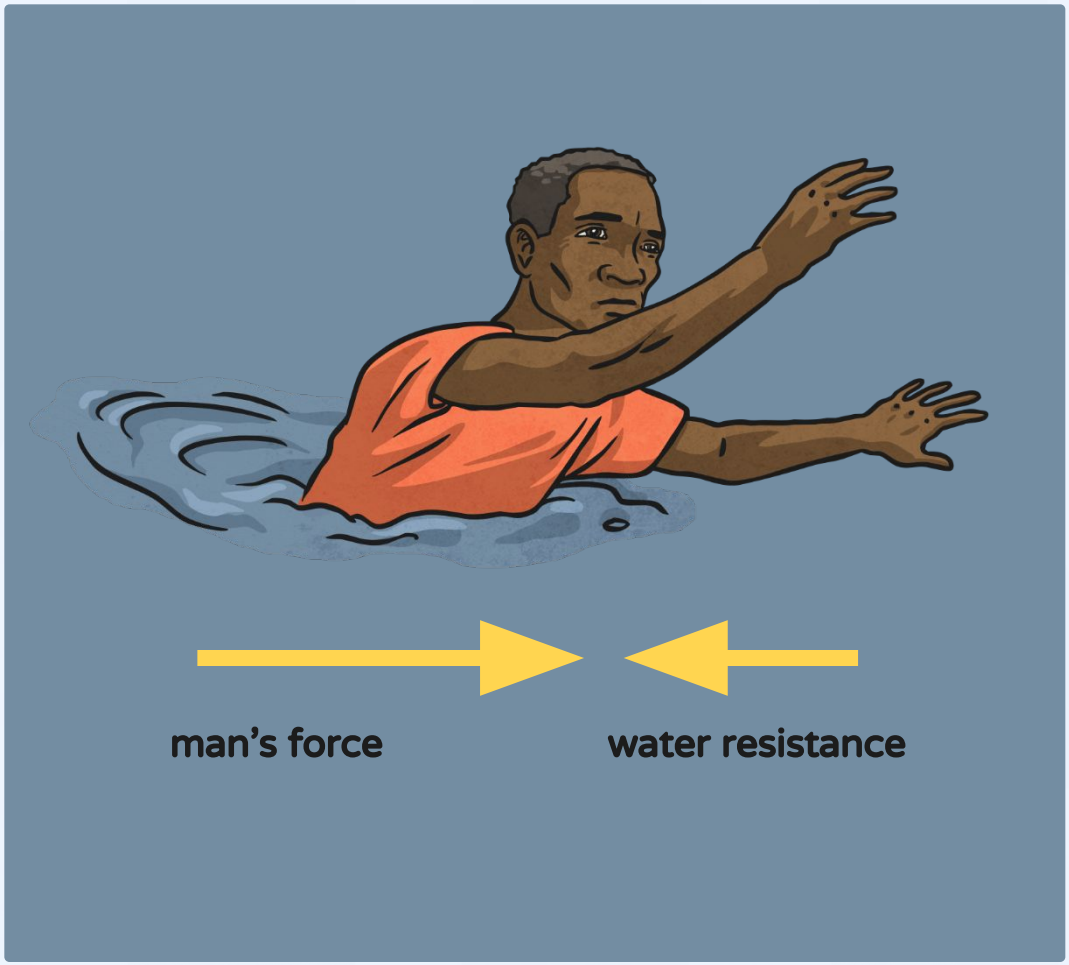
Water resistance is pushing against him as the force of his muscles pulls him through the water.



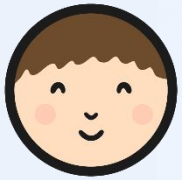
Balanced and Unbalanced

The force of **water resistance** is **less** than the force he is using to pull himself through the water.

He is able to move forwards through the water because the forces are **unbalanced**.

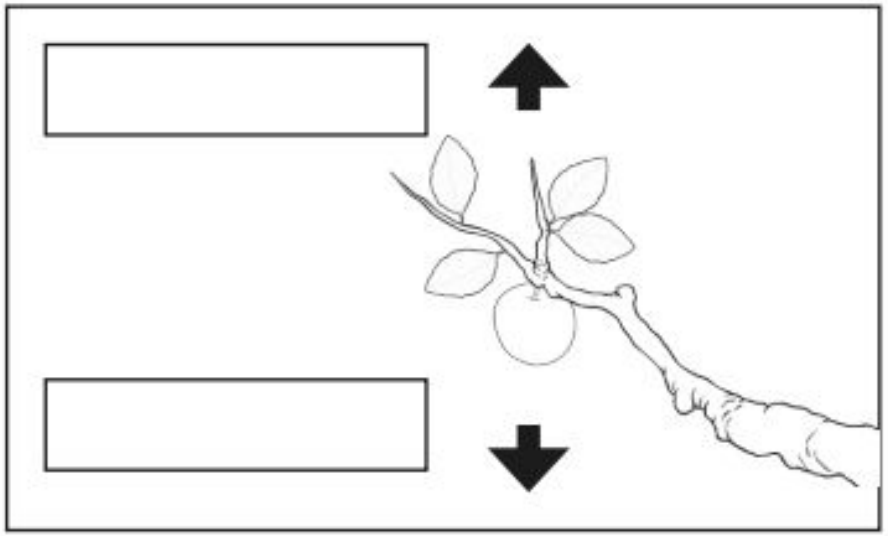


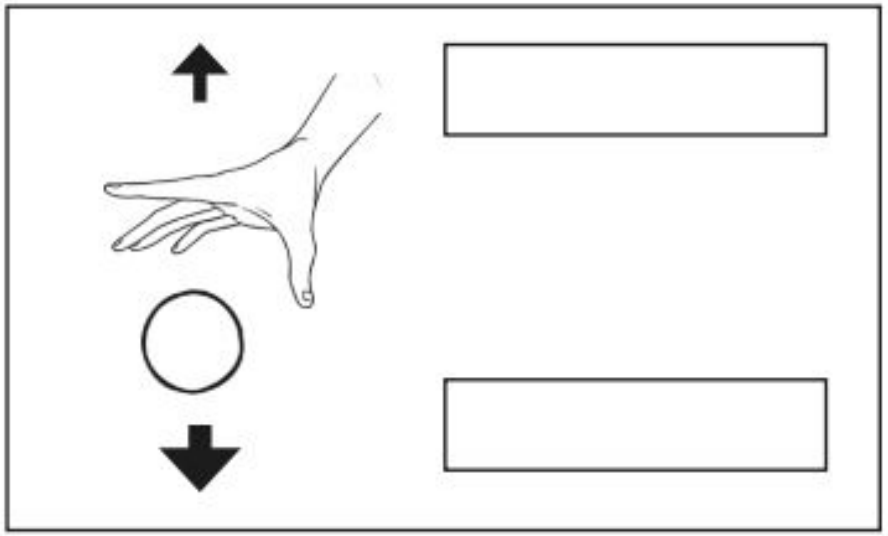
Forces in Action



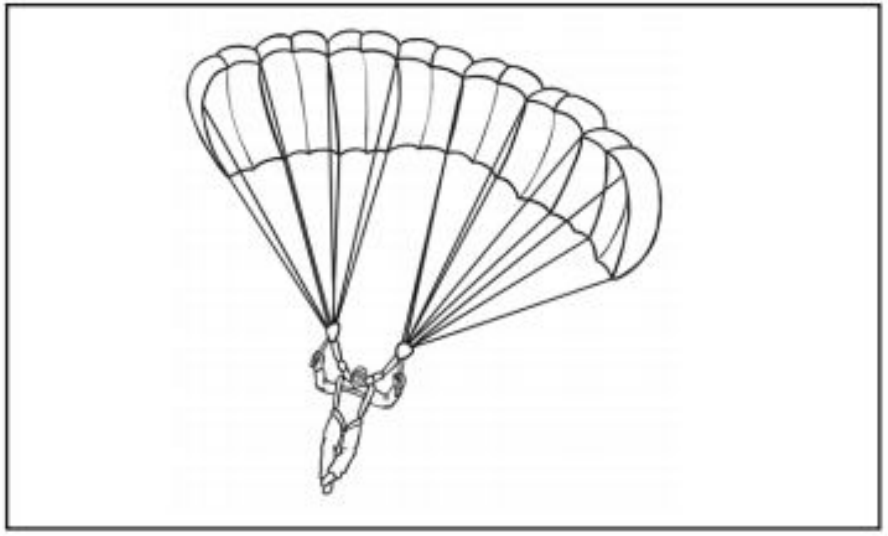
Complete your **Forces in Action Activity Sheet** by naming the forces acting on the objects in the pictures and drawing arrows to show the size of the forces. Then draw your own examples, add arrows and label the forces.

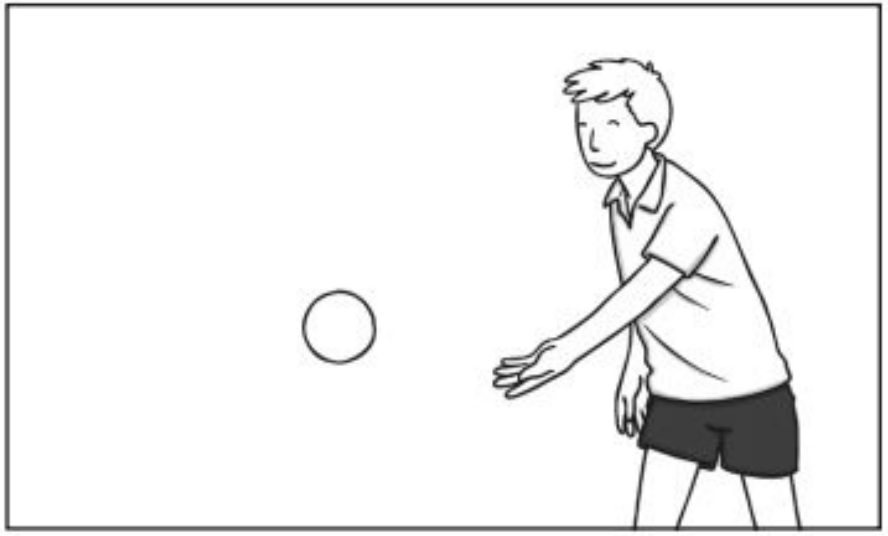
In the two pictures below, the arrows represent forces acting.
Write the names of the forces in the boxes





Draw your own arrows and label them to show the forces acting.





Draw your own pictures in the boxes below. Then label and draw your own arrows to show the forces acting.