Balanced and unbalanced forces

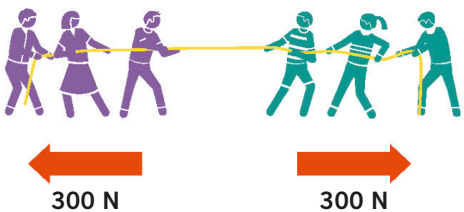
When forces acting on the same object in opposite directions are the same size, we say they are balanced. Balanced forces cancel each other out. A change in an object's motion only happens if the forces acting on it are unbalanced.

Key facts

- ✓ **When two forces on an object are balanced, they are equal and act in opposite directions.**
- ✓ **Balanced forces cancel each other out, so they do not change the motion of an object.**
- ✓ **When the forces acting on an object are unbalanced, they change its motion.**

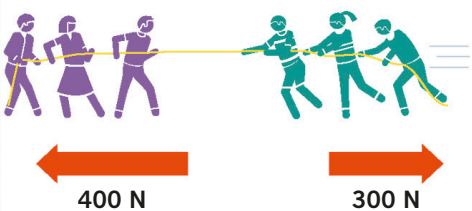
Balanced forces

These two tug-of-war teams are pulling with equal force. The forces are balanced and cancel each other out, so there is no movement.

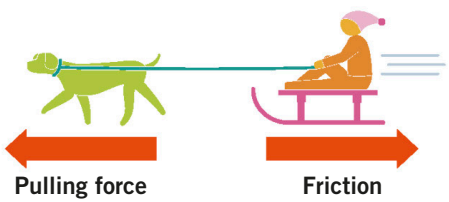


Unbalanced forces

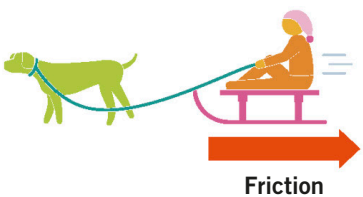
When the purple team pulls harder, there is an overall force in that direction and the teams begin to move.



When an object is moving at a constant velocity, the forces acting on it are balanced. Here, the pulling force from the dog is balanced by friction between the sled and the snow, which acts in the opposite direction. The dog and the sled both move forward at a constant velocity.



If the dog stops pulling, an unbalanced force is acting in the opposite direction to the sled's motion, so it slows down. An unbalanced force acting sideways (such as a strong wind) would change the direction of movement.



First law of motion

In the 18th century, the English scientist Isaac Newton described the effect of forces on motion with his first law of motion. This says that an object either remains at rest or moves in a straight line at a constant velocity unless an unbalanced force acts on it. For example, when you flick a marble, it continues rolling after the force from your finger has stopped.