

What are the three laws of motion?

Newton's laws of motion explain how things move and interact. The first law essentially describes inertia; the tendency of objects to resist changes in motion. It is the reason a ball doesn't roll along the floor until you kick it and why spacecraft continue to drift through the Solar System even after their fuel is spent. The second law describes how the force required to move an object is related to the mass of the object and explains we can push a bike much faster than we can push a car. The third and final law explains what happens when two objects interact. As your feet push down on the floor, the floor pushes back.

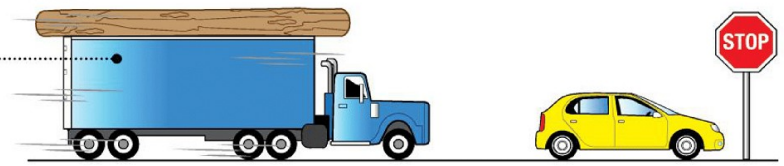
Newton's first law

A body in motion tends to stay in motion



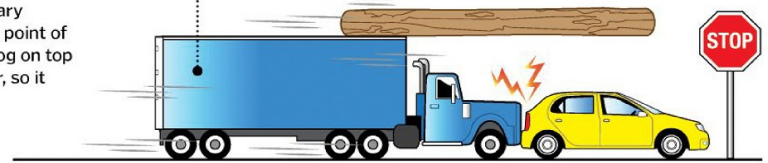
Inertia

Once an object is moving, it will continue to move in a straight line unless a force is applied.



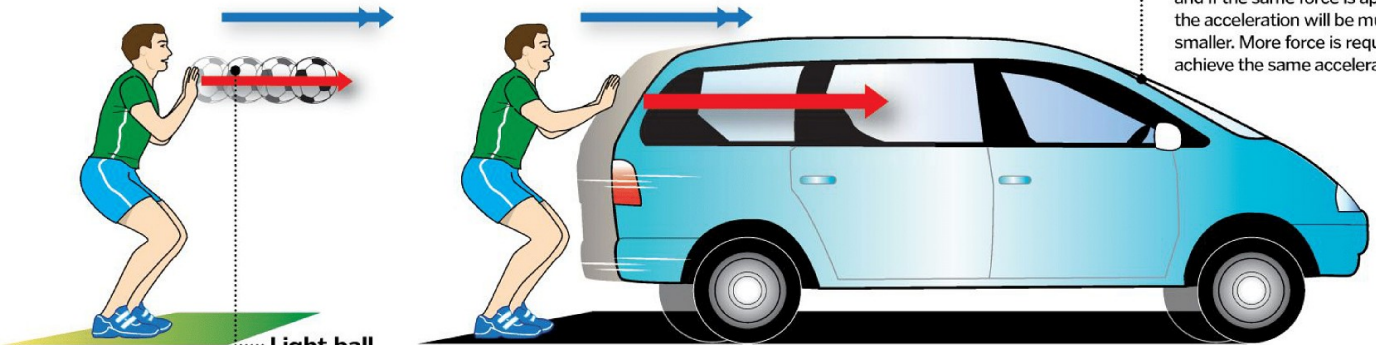
Collision

As the truck strikes the stationary vehicle, the normal force at the point of contact causes it to stop. The log on top of the truck does not hit the car, so it continues to move forward.



Newton's second law

Force is equal to mass times acceleration ($F=ma$)



Light ball

The force applied to a ball as it is thrown causes it to accelerate through the air. The acceleration is equal to the force divided by the mass: the ball has a low mass, so it accelerates quickly.

Heavy car

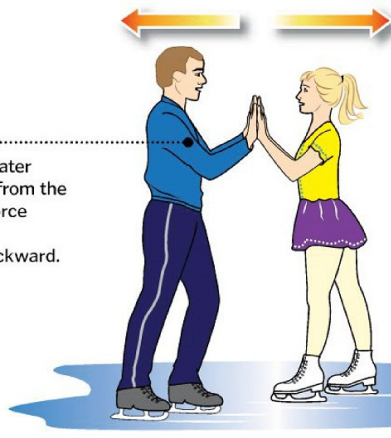
The car is heavier than the ball, and if the same force is applied, the acceleration will be much smaller. More force is required to achieve the same acceleration.

Newton's third law

For every action, there is an equal and opposite reaction

Action

As the first skater pushes away from the second, the force causes her to accelerate backward.



Reaction

The push of the first skater is matched by an equal force pushing the second skater in the opposite direction. As the second skater has a higher mass than the first, he accelerates more slowly.

