

Forces and Motion

A Activity – Forces

Draw arrows to show some of the likely forces involving the boy and the ball he has kicked:

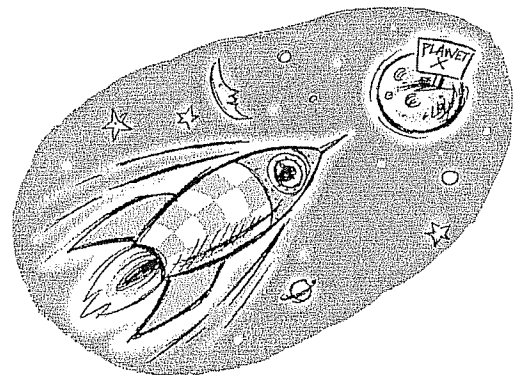
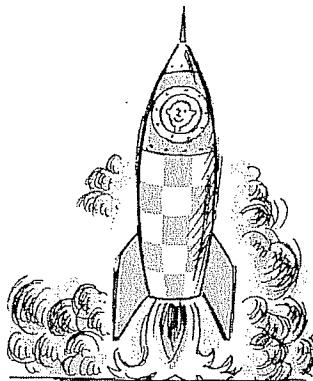
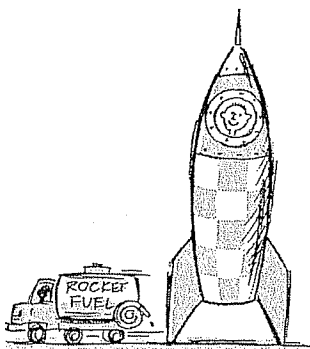


B A space rocket illustrates how Newton's Laws work:

- ① • Before lift-off, there's no force to move the rocket, so it stays still. Law _____
- ② • At lift-off, hot gases are pushed out the back of the rocket. The gases push the rocket in the opposite direction. Law _____ (It's a bit like letting go of an inflated balloon.)
- ③ • After lift-off, the rocket accelerates upwards. Law _____
- ④ • There's no air (no friction) or gravity in outer space, so there's no force acting on the rocket. Once the motor is turned off, it will keep going in a straight line – and at the same speed. Law _____
- ⑤ • If the rocket travels near a planet, gravitational force will alter its course. Law _____

C Activity – Rocket Science

Write First Law, Second Law, or Third Law under the picture that illustrates each of Newton's Laws:



1. _____

2. _____

3. _____

Dangerous Momentum

Momentum is concerned with the forward movement of an object – an object will keep moving at the same speed until something slows it (Newton's First Law). Imagine you are standing in a moving bus. The bus has momentum, but so do you. If the driver brakes suddenly, and the bus loses its momentum and stops you still have your momentum, so you keep moving and fall forward (hold on!). Momentum can also be understood as a measure of how hard it is to stop a moving object. This depends on the speed of the object and on how massive it is. (In the science of mechanics, the formula is 'momentum = mass x velocity'.)

Amazing Inventions: Car Safety

Momentum can be deadly if a car stops suddenly. It could throw you into the windscreen – if you have no seat belt on. Safety features in new cars help overcome the effect of momentum in a very sudden stop.

- Seat belts transfer forward body movement to the car itself.
- Airbags inflate, slowing the moving human body and spreading out the impact area.
- There's a crumple zone at the front of the car – which squashes up easily in a crash. It absorbs some of the energy of the impact.



Activity – Car Design

Label this car with safety features found in new cars:

