



## Guide for Parents

This activity covers some of the forces encountered in the Physical World, and aims to encourage collaboration between adults and children, as well as shape basic knowledge of air pressure and the laws of motion. Scientists and engineers can harness this knowledge to make objects move more efficiently.

It is not expected that parents know the answers to these or any other questions that arise, but rather this is a guide to what questions you might ask, and to encourage families to follow up on answers and learn together.

### **Air Pressure**

There is air all around us, and it acts as a force on surfaces, both on the outside and on the inside of the chamber surface, e.g. a balloon, a bottle, etc. Rockets, like balloons, are a pressurised chamber, so when it is pumped up, the air on the inside pushes with more force on the surface than the air outside. When we open up the chamber, through the valve, the air escapes and this force produces thrust in the opposite direction. This is one of Newton's Laws of Motion. These laws are all around us, when we walk, cycle, drive, play sports, etc. They explain why things move in certain directions, and how fast they can move.

### **Water Bottle Rocket**

There are many ways to launch the rocket, but remember to do this activity in a wide open space, and keep the launch area clear during the launch, for everyone's safety. Really good instructions for this activity, including making a launcher, can also be found at the Science Learning Hub (<https://www.sciencelearn.org.nz/resources/406-water-bottle-rockets>). You might want to try redesigning your rocket and testing it again, but remember to only change one thing at a time to see the effect of each change – this is the start of experimenting!

Questions can be asked about what you see as you go, and about the science behind these observations. Here is a list of examples, but feel free to explore further ideas as you do the activity.

*How could you make this rocket go higher? Faster? Further?*

*How could you measure the speed or distance the rocket travels?*

*What would happen if you use a different number of fins?*

*What would happen if you use a different volume of water?*

*What would happen with different sized bottles?*

*How could you improve on the landing?*