

FORCES

Early Level

Lesson 1	Push the Boat out
Outcome	Through everyday experiences and play with a variety of toys and other objects, I can recognise simple types of forces and describe their effects. SCN 0-07a
Resources	Range of push / pull toys, inflated balloons, rubber bands, model plane
Lesson Outline	<p>Pupils are given a range of toys, rubber bands and balloons to play with. They investigate what happens when forces are applied and start to describe forces using words such as push, pull, twist, stretch, and squeeze.</p> <p>They can sort toys into groups depending on whether they need to be pushed or pulled.</p> <p>What happens to the movement when they increase the force, ie push harder.</p> <p>Is it easier or harder to stop a bigger object?</p> <p>Using a catapult and model plane show that the bigger the force the faster the plane flies.</p>

Level 1

Lesson 1	Blast off!
Outcome	By investigating forces on toys and other objects, I can predict the effect on the shape or motion of objects. SCN 1-07a
Resources	Rope, newton meters (spring balances), catapults, balls
Lesson Outline	<p>Recap different types of forces and their names.</p> <p>Give pupils the chance to experience different forces, Find opportunities around the grounds to show forces at work. Get pupils to identify the forces. E.g swings, climbing frames, bikes, scooters, bouncing balls off the wall. Talk about the wall pushing the ball back. Look at the effect of gravity on how a ball moves when it is thrown.</p> <p>Get pupils to record the forces acting on objects; start to talk about how forces can be represented by arrows with size representing the size of the force.</p> <p>Connect the size of the force with the speed an object moves.</p> <p>Start to measure forces using newton meters. Set up a rope with a newton meter at each end and get pupils to have a tug of war. Show that if the forces are equal, the rope doesn't move, but if one force is greater the team wins.</p>

Level 2

Lesson 1	Come Fly with me.
Outcome	By investigating how friction, including air resistance, affects motion, I can suggest ways to improve efficiency in moving objects. SCN 2-07a
Resources	Circles of paper, paper clips, timers.
Lesson Outline	<p>Recap the words associated with forces.</p> <p>Talk about what happens to objects when they move, why do they slow down? How easy is it to run in a swimming pool – lead to the idea of friction and resistance (Air and Water).</p> <p>Get pupils to rub hands together, they get hot because of the friction.</p> <p>Interleaf two paperbacks and then try to pull them apart.</p> <p>Parachute investigation</p> <p>What affects how fast a parachute takes to fall – get pupils to think about variables and how they could measure them. In this investigation the pupils will make a cone, whose diameter can be varied, hence changing the amount of air resistance. Get pupils to design an investigation to relate the size of the cone to the time taken to fall. Think about a fair test and get the pupils to make a prediction they can test. (Could use a template to design the investigation)</p> <p>Carry out the investigation.</p> <p>Write up including a diagram showing the forces acting on the cone.</p> <p>To see this investigation in practice use this link https://youtu.be/WyFx0dwVuQA</p>
Extension	

Lesson 2	Using resistance
Outcome	
Resources	Black plastic bags, string, tape, eggs
Lesson Outline	<p>Remind the pupils of the results of the air resistance investigation.</p> <p>Challenge – when astronauts return to Earth the land in a capsule which has to be slowed down by using parachutes. Pupils have to make a parachute which will safely land an egg without it breaking.</p> <p>See our version Parachutes - Can you save an egg?</p>

Lesson 3	Smooth mover
Outcome	I can suggest ways to improve efficiency in moving objects. SCN 2-07a
Resources	Rocket kit and pump. Rocket launcher kit and card and tape to make rockets.
Lesson Outline	<p>Remind pupils about air resistance and the previous lessons. Demonstrate the Rocket. Ask the pupils to think about why it works, what are the forces acting on the Rocket.</p> <p>Start to think about the shape of the Rocket, why is it that shape? Can they think of other streamlined shapes both in nature and man-made.</p> <p>Show them the rocket launcher and give them the challenge of designing a rocket made from card that will fly higher than everyone else's.</p> <p>For some ideas go to Making Rockets</p>
Extension	<p>Make paper planes or paper flying crowns to show how streamlining can work. https://www.youtube.com/watch?v=ujd977zS14w</p>