Forces and Motion! Year 7 Science at Home

You can help! Your child is learning about forces — pushes and pulls — and how they explain why objects move or stay still. Forces are at work everywhere around you every day!

Why are we learning this? Forces in everyday life up here

Understanding forces has always had practical importance in this part of Australia. First Nations peoples designed boomerangs that use aerodynamic forces to curve and return — a remarkable feat of physics knowledge developed over thousands of years. Spearthrowers (woomeras) increase the force of a throw by acting as levers. Today, the same principles of force, mass and acceleration apply to vehicles navigating wet-season roads, boats fighting river currents, and machinery used in remote communities. When your child learns about forces, they are learning to describe and predict the physical world.

My child will learn to:

✓ Identify forces
Recognise pushes, pulls, gravity and friction as forces acting on objects.

✓ Understand balanced forces
Explain why an object stays still or moves at constant speed when forces are balanced.

✓ Understand unbalanced forces
Describe how unbalanced forces cause objects to speed up, slow down or change direction.

✓ Understand simple machines
Explain how levers, pulleys and ramps use forces to make tasks easier.

Big ideas to know:

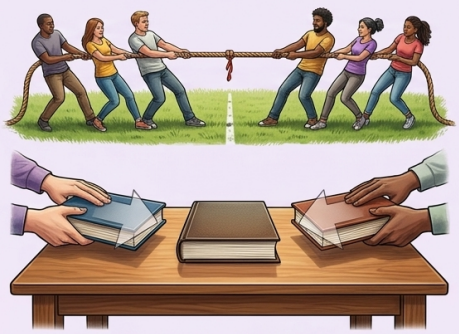
Forces as arrows
Scientists draw forces as arrows — the length shows how strong the force is, and the direction of the arrow shows which way it acts. This makes it easy to see whether forces are balanced or not.

Balanced vs unbalanced
When all forces on an object are equal and opposite, they are balanced — the object does not change its motion. When forces are unbalanced, the stronger force wins and the object speeds up, slows down, or changes direction.

Simple machines
A simple machine is a device that changes the direction or size of a force. A lever (like a seesaw or crowbar) lets you move a heavy load with a smaller force. A pulley (like a flagpole) changes the direction of a force. A ramp lets you move something heavy using less force over a longer distance.

BALANCED FORCES
(Object stays still or moves at same speed)

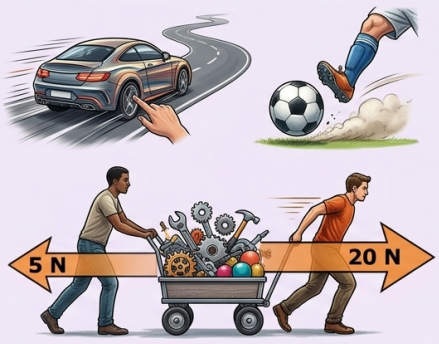
e.g. tug-of-war tied, book sitting on table



Forces are EQUAL
= no change in motion

UNBALANCED FORCES
(Object speeds up, slows down or changes)

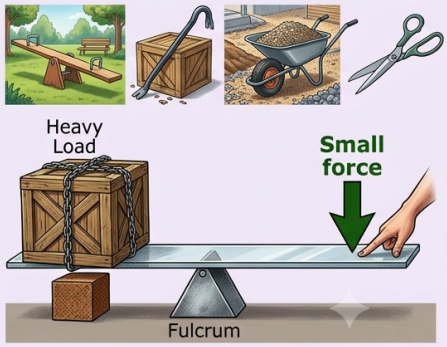
e.g. car accelerating, ball kicked off ground



Forces are UNEQUAL
= object moves right!

SIMPLE MACHINES
(Reduce force needed to do a job)

e.g. seesaw, crowbar, wheelbarrow, scissors



Lever: small force
moves heavy load!

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Forces in action — everyday examples

Situation	Forces acting	Balanced or unbalanced?
Book sitting on a table	Gravity pulling down, table pushing up	Balanced — book does not move
Car braking to a stop	Friction (brakes) pushing backwards, forward motion	Unbalanced — car slows down
Ball rolling on flat floor	Gravity balanced by floor, friction slowing roll	Slightly unbalanced — friction slows it
Rocket launching	Thrust pushing up > gravity pulling down	Unbalanced — rocket accelerates up!
Boomerang in flight	Aerodynamic lift, drag, spin — complex balance	Carefully designed unbalanced forces

Think Like a Scientist — Force Detective

Choose 5 activities happening around your home today. For each one, identify all the forces acting and decide: are they balanced or unbalanced? Draw simple force arrows to show your thinking.

Ask: "If the forces were balanced, would anything move? What force would you need to add to make it move? What would happen if you doubled that force?" Let your child think it through!

Situations to analyse:

1. A door being pushed open — what forces act?
2. A ball thrown into the air — what happens and why?
3. Someone sitting in a chair — list all forces
4. A bicycle being pedalled — friction, gravity, push
5. A heavy box being dragged across the floor

Questions to ask your child

1. If you push a heavy box and it does not move, are the forces balanced or unbalanced? What other force is pushing back?
2. Why does a ball eventually slow down and stop if you kick it on a flat surface?
3. How does a wheelbarrow make lifting a heavy load easier? What type of simple machine is it?
4. If you push a shopping trolley harder, what happens to it? What law of motion explains this?
5. Why do passengers lurch forward when a car suddenly brakes? What does that tell you about forces?
6. How did First Nations peoples use the lever principle in traditional tools like spearthrowers?
7. What forces act on a person jumping off a diving board? What happens to those forces over time?

Force arrows are a great visual tool! Draw a simple diagram of any situation and sketch arrows to show each force. Longer arrow = stronger force. If the arrows cancel out, forces are balanced — the key insight in understanding motion.

Key words to know:

Force	A push or pull that can change an object's motion, speed or shape — measured in Newtons (N)
Balanced forces	When forces acting on an object are equal and opposite — the object does not change its motion
Unbalanced forces	When forces are not equal — the object speeds up, slows down or changes direction
Gravity	The force that pulls objects towards the centre of Earth — what makes things fall and gives objects weight
Friction	A force that opposes motion between surfaces in contact — slows things down
Simple machine	A device that changes the direction or magnitude of a force — lever, pulley, ramp, wedge
Newton (N)	The unit of force — one Newton is approximately the force of gravity on a 100g apple

Key words to look up

Force · Balanced · Unbalanced · Gravity · Friction · Simple machine · Newton

What school will check

By the end of Year 7, your child needs to investigate and represent balanced and unbalanced forces acting on objects, and relate changes in an object's motion to the forces acting on it.

Try it at home!

Try this with a rubber band and a heavy book: pull the rubber band to slide the book across a smooth surface, then across carpet. How does the force you need to apply compare? What is the difference? Can you feel it?