

Early Years Science: Forces

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Wednesday, March 15, 2006

Learn about forces and then investigate their effects with the children, in the first part of a new science series by Linda Thornton and Pat Brunton



Forces make things move, change shape and balance. They are associated with the movements of pushing, pulling and twisting and affect every aspect of our daily life - opening doors, getting dressed, even standing still.

Children experience forces from the day they are born and will have experimented with their effects. Activities investigating forces will build on these early experiences and help nurture children's scientific understanding.

Some examples of the forces of push, pull and twist, across the six areas of learning, are using puppets, reading pop-up books, performing action rhymes, threading beads, digging and lifting sand, riding bikes, weaving and playing percussion instruments.

What do I need to know?

Use the information below to help you support young children's scientific learning. It is not intended that Foundation Stage children are taught these facts, but that they are used to provide experiences that the children can draw on as they build their own scientific understanding.

Pushes and pulls Everything has forces acting on it. You can't see forces, only their effects, and some forces can't be felt. This makes them difficult to understand - or believe!

All forces are either pushes or pulls. A twist is a particular kind of pull or push that involves turning. Forces can make things:

- stay still or start to move
- speed up or slow down
- change direction
- change shape.

Staying still and starting to move

Objects and people stay still when the forces on them are the same in all directions. A book resting on a table or a person sitting on a chair are pushing downwards with a force; the table and

the chair are pushing back with an equal force in the opposite direction. A ball on a flat surface will stay still until a push or a pull is applied to it, when it will start to move.

Speeding up and slowing down

Forces are involved when an object or a person changes speed, either going faster or slowing down. Pushing yourself along on a scooter will make you and the scooter go faster. If you stop pushing, the scooter will slow down and stop.

Changing direction

You can't change direction without a force. If you push a wheelbarrow or a buggy along in a straight line and apply a push or a pull to one of the handles, it will change direction. When you roll a ball against a wall it will travel in one direction until it hits the wall. The push from the wall will make it change direction.

Changing shape

Some objects change shape when a force is applied to them. Squeezing, squashing and stretching are all examples of using pushes and pulls.

Manipulating dough involves pushing and pulling it to change its shape.

Gravity

Gravity is a special kind of force which does not need to touch an object to have its effect. The Earth's gravity pulls objects down and holds them on to the Earth. Gravity is acting on us all the time but we are not usually aware of it. If you drop a toy, it will always fall downwards due to the pull of gravity. This is also why you will always fall down, not up, when you lose your balance.

Simple machines

Simple machines such as levers, pulleys, wheels and ramps help us to use forces effectively. They can be used to increase or decrease a force or to change its direction. You will be familiar with levering open the lids from containers, opening window blinds, pushing trolleys and using slopes and slides.

Investigating forces

Working with clay - forces indoors

This activity gives you the opportunity to look at pushing and pulling, changing shape and using simple machines.

What you need: Large lump of clay; utensils such as a rolling pin, a garlic press or potato dicer, cutters, lolly sticks, spatulas or clay-working tools

What to do

- Encourage the children to explore the clay with their hands. You may want to let them investigate the large lump of clay before dividing it up into individual portions.
- Help the children to divide the large lump. Talk about the pushing, pulling and twisting that happens as you tear off pieces of clay.
- Let the children explore what they can do with the clay - pulling it, pushing it, squeezing, squashing and rolling it. What happens when you pull the clay? What happens when you press hard into the clay? What happens if you push gently? How can you make your piece of clay longer?
- Show the children how to make a 'thumb pot' by pushing, pulling and twisting a small lump of clay using their thumbs. Talk with the children about what they are doing to change the shape of the clay.
- Introduce the tools and simple machines and talk about how they might work and what they might do.
- Encourage the children to investigate how they can use the tools to change the shape of the clay.

- Draw their attention to how the tools use pushes, pulls and twists to roll, flatten, squash, squeeze, cut and scrape the clay. Which tools work by pushing them? Which ones do you pull or twist? Is it easier to change the shape of the clay with a rolling pin or with your hands?

Balls and ball games - forces outdoors

This activity provides opportunities to explore the effects of gravity, staying still and starting to move, speeding up and slowing down and changing direction.

What you need: area with a hard surface and a wall or solid fence; slope or ramp, either a permanent feature or a wide plank and some large blocks; set of small balls that are all the same, such as tennis balls or rubber balls.

What to do

- Ask the children to hold a ball in their hands and to investigate what happens when they let go of it.
- Focus the discussion on the balls always falling downwards when they are dropped. Can you make a ball fall upwards?
- Ask the children to put their balls down on a flat surface. Do they move? Why not?
- Next, explain that you want the children to find different ways to make the balls move. Give them plenty of time to explore pushing, rolling, kicking, throwing, bouncing and hitting. How many different ways did we find to make the balls move? When did they move fast/slow/further/in a straight line? What made them move faster/slower/ further?

To develop these activities:

- use a ramp to explore how it changes the speed of a rolling ball
- ask the children to work in pairs, with one child rolling the ball and the other child finding ways to slow it down or stop it.
- roll the balls against a wall or fence to explore how they change direction when they hit the wall.

Vocabulary to introduce

push pull squash squeeze twist stretch move fast slow speed machine still direction down gravity