

Unit 2E Forces and movement

ABOUT THE UNIT

The work in this unit extends children's understanding of how pushes and pulls affect the movement and shape of objects.

Experimental and investigative work focuses on:

- thinking about what is expected to happen
- making measurements
- recording and presenting results and deciding whether the results support the prediction
- deciding whether comparisons are fair.

Children also have opportunities to relate science to the ways in which familiar objects move.

This unit takes approximately 7 hours.

WHERE THE UNIT FITS IN

Builds on Unit 1E 'Pushes and pulls', and 2D 'Grouping and changing materials'

Children need:

- to be able to describe different kinds of movement
- to know that pushes and pulls can make things start or stop moving
- to have experience of measuring length in standard or non-standard units.

Links with Unit 1C and with physical education.

VOCABULARY

In this unit children will have opportunities to use:

- words related to movement
eg direction, distance, force
- comparative expressions *eg further, furthest, fast, faster, fastest, slow, slower, slowest, higher*
- expressions of reason using 'because'
- expressions making predictions.

RESOURCES

- materials such as plasticine or dough
- collection of toy cars and other toys that move
- apparatus for measuring length
eg metre sticks or tape measures
- bean bags and/or soft balls
- bricks and pieces of wood/thick card to make ramps
- collection of pictures or video clips showing moving objects
- access, if possible, to large moving apparatus

EXPECTATIONS

at the end of this unit

most children will:

describe how to use pushes and pulls to make familiar objects speed up, slow down, or change direction or shape; recognise that pushes and pulls are forces; plan a comparison and decide whether it was fair; make measurements of length using standard units and present these in a chart

some children will not have made so much progress and will:

describe how to change the movement of familiar objects using pushes and pulls; make measurements of length and compare these

some children will have progressed further and will also:

explain how they made their comparison fair and suggest several factors to investigate

LEARNING OBJECTIVES

POSSIBLE TEACHING ACTIVITIES

LEARNING OUTCOMES

POINTS TO NOTE

Using a collection of pictures, a video clip or a collection of toys to illustrate ways of moving, review learning about movement from Unit 1E by asking children to suggest as many words as possible to describe the movement in the pictures/video/toys.

Teachers will need to take account of what this activity shows about how well children can describe movements in their short-term planning of later activities.

CHILDREN SHOULD LEARN

- that sometimes pushes and pulls change the shape of objects

- ◆ Present children with a collection of materials *eg plasticine, dough, bag of sand, sponge, elastic bands*. Ask children to explore how to make a variety of shapes *eg sausage, ball, worm* to describe what action they used *eg twist, stretch* and to classify the action as a push or a pull.

CHILDREN

- describe what they did using words such as *twist, squeeze, stretch, pull out* and classify actions as pushes or pulls *eg stretching is a pull, squeezing is a push*

This activity is very similar to an activity in Unit 2D and could be carried out quickly if children seem familiar with the ideas.

- that pushes or pulls can make things speed up or slow down or change direction

- ◆ Present children with a collection of toy cars and ask them how to make them move faster, slower, or change direction. In PE ask children to throw bean bags to each other or hit soft balls to each other and suggest how to make them move faster or slower or change direction.

- describe how to make things speed up or change direction *eg by saying when I push the car hard it goes faster and faster, when I hit the ball it went off to the side*

Forces make objects 'speed up' which implies getting faster continuously. The term 'move faster' could imply simply going from one steady speed to another.

- to explain how to make familiar objects move faster or slower

- ◆ Ask children to talk about how to make themselves move fast *eg on a bicycle, roller blades, a slide* and how they make themselves slow down. If possible go into the playground where children can demonstrate using equipment *eg scooters, slides, swings* and see how they make themselves slow down. Ask them to record their ideas in drawing and simple writing *eg a story*.

- describe how they can make themselves slow down, *eg I held onto the side of the slide and this slowed me down*

- to suggest questions about ways in which different objects move
- to make measurements of distance using standard or non-standard units
- to decide whether their comparison was fair

- ◆ Ask children to think about toy cars rolling on a flat surface and to suggest a question they might explore *eg Do the lorries travel further than the trucks?* Help children to decide what to do and to measure the distance travelled by each in standard or non-standard units *eg straw lengths*. Talk with the children about what they found out and challenge them by suggesting you could get different results. Help them to realise that factors *eg surface and how hard you push* make a difference.

- measure distances carefully in appropriate units
- suggest a way in which the comparison was unfair *eg I pushed the truck harder than the lorry*

When the toy cars roll they are not slowed by friction between the wheels and the surface but by friction at the axles.
At this stage these activities should be used in describing rather than explaining what happens.
Children could be introduced to the idea of repeating measurements in this type of activity *eg when a pushed car goes off in obviously the wrong direction*.

- to suggest a question to test and predict what will happen
- to decide what to do and what measurements to take
- to make measurements and record these in a prepared table
- to use results to make comparisons and to evaluate whether the test was fair
- to say whether the prediction was correct and to try to explain the results

- ◆ Let children explore toy cars rolling down ramps. Ask them what makes a difference to how far the car travels from the bottom of the ramp *eg height of ramp, how far up the ramp it starts, surface of ramp, amount of push*. Ask children to suggest a question they might test. Help them to decide what to do. Talk with children about how they will measure how far each car has gone. Provide children with an outline table for recording results. At the end of the work, ask children what might have made comparisons between results unfair and whether what happened matched their prediction.

- decide how to alter the ramp *eg by using different numbers of bricks to support the top*
- measure distances travelled in units such as straws, bricks, metres or centimetres, recognising that marking the starting and finishing points is important
- relate their results to their prediction *eg I was right, it went further with the highest ramp, there was more force on it*
- describe one way in which the comparison might not have been fair *eg it wasn't fair because the red car started nearer the top than the blue car*

Children can observe and measure how far objects move much more readily than they can observe how fast they move. Measuring distance, as in this activity, gives information about 'how far' something has moved.
This activity offers children the opportunity to carry out a whole investigation. It may be helpful to concentrate on the particular aspects of investigation highlighted in the learning objectives.

- to use results in a table to draw a block graph

- ◆ Collect results from several investigations and show children how to use them to draw a block graph using distances in whole numbers and categories *eg surface, number of blocks supporting ramp*. Use other results for practice.

- with help, draw a block graph from experimental results

- that pushes and pulls are examples of forces

- ◆ Review what children know about the effects of pushes and pulls on objects by making a word list related to movements, and introduce force as a word which encompasses pushes and pulls.

- describe examples where pushes and pulls alter movement
- state both pushes and pulls are forces

