CurriculumVisions 1E Science@School

Pushes and pulls

Teacher's Guide CD

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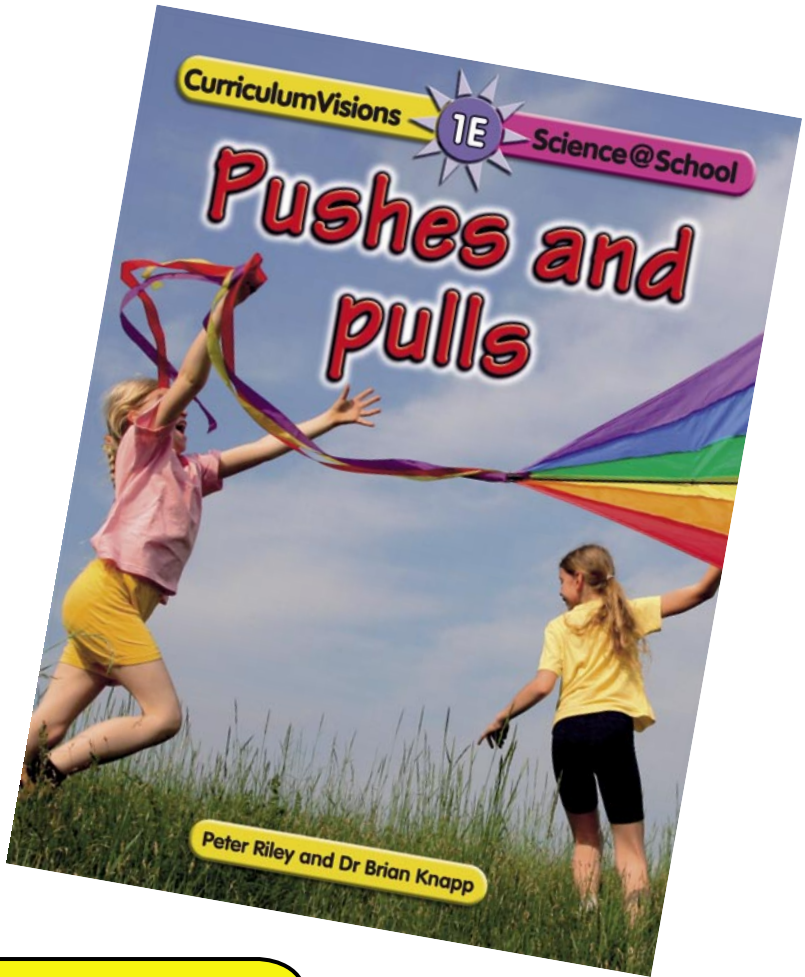

Peter Riley

Curriculum Visions

A CVP Teacher's Guide

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Introduction

The pupil's book

The Key stage 1 Science@School series is a series of twelve books. Each one addresses one of the QCA units in the Key Stage 1 science curriculum.

Each spread in the book addresses one or more objectives in a QCA unit by providing photographs, simple text and questions to stimulate discussion.

Each book has an illustrated glossary and a simple index for finding information.

The teacher's guide

It may be that you already have a scheme of work and wish to use the books to support it. Alternatively you could use the books, this CD ROM and the **CurriculumVisions.com** web site, which provides support material in the form of extra text (with audio option), pictures, captions, activities and demonstration videos to build a new scheme. Whichever way you choose, the notes in this teacher's guide have been set out as if you were using each page or spread as the basis for a lesson. You may follow each set of notes in their entirety to build up your lesson or take parts of the notes to fit into your scheme.

The teacher's notes contain information about practical work. You should check your school policies on practical science work and only select activities for which you are confident to take responsibility.

The book *Be Safe!* published by the ASE (ISBN 978–0–86357–324–8) provides useful guidance on carrying out science activities.

The structure of the notes

The notes for each page or spread follow the same structure, which is outlined here.

Objectives

These may be linked to the QCA objectives or build on them to enrich the topic.

Resources and preparation

Suggestions may be made for building on the visual display of the books with posters and models.

There are also pictures (aka flashcards) at the end of the notes to each lesson, which may be printed off and used as triggers to start the lesson or used in the plenary as revision. When the pictures have been used they could be displayed on a wall and others added as the subsequent lessons are completed. This will make a colourful summary of the work which could be used as a final revision resource when the book is completed.

If you are using the **CurriculumVisions.com** web site log in, go to Science, Year 1, Unit 1E Pushes and pulls.

There may be some suggestions for building practical work into the use of the pages in the book and these include a list of requirements (simple, readily available materials) and advice on preparing the requirements for use in the lesson.

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Introduction

Starting the lesson

Each lesson begins with a short activity, which helps settle the children and focus them on the work ahead.

Activities with the page

These may be reading activities, observing and discussing the pictures or answering a question. There may also be practical activities which are designed to develop a range of practical science skills from making observations to carrying out fair tests.

Differentiation

There are suggestions for providing help and activities for children of different abilities.

Assessment

There are suggestions for assessing the children's work. There are three assessments for you to print off at the end of this guide. These are for use with lesson 2 (page 51), lessons 4 and 5 (page 53) and after completing all the lessons (page 55), or you could use all three together as an end of unit test. Guidance for the answers is given in the assessment section of the lesson notes.

Plenary

The work done in the lesson is reviewed in this section and there may be a further activity to help secure the children's knowledge.

Outcomes

These may be linked to the QCA objectives or build on them to enrich the topic.

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Moving about

Objectives

- To know that there are many sorts of movement.
- To know that movement can mean changing direction.
- To know that movement can mean speeding up or slowing down.

Resources and preparation

Space at the school gate or other part of the school grounds for the children to watch safely the vehicles and people moving along a nearby road or street.

Make a model of each of the following before giving materials to the children and classroom assistants for them to make them too. A model roundabout: cut out a disc of card 10 cm in diameter, use a pencil to make a hole in its centre. Cut a 7 cm length of plastic straw and stick it through the hole. Stick one end of the straw in the upturned centre of a cotton reel (bobbin). Swing: cut a piece of cardboard 34 cm long by 4 cm wide. Fold it into an 'n' shape with legs 14 cm long. This represents the sides of a swing. Cut a piece of card 3 cm by 2 cm – this represents the seat of a swing. Cut two 10 cm lengths of thin string and use sticky tape to attach them to the seat and cross bar of the swing. Slide: cut a piece of cardboard 24 cm long by 4 cm wide, fold it to make an 'n' shape with 10 cm legs. This forms the main support of a slide. Cut a piece of card 18 cm by 4 cm and attach it to the support with sticky paper to make the slide. Each group of children and their helper will need one cardboard disc 1 cm in diameter, a pencil, straw, cotton reel, scissors, cardboard strips 34 cm x 4 cm, 3 cm x 2 cm, 24 cm x 4 cm 18 x 4 cm, two 10 cm lengths of thin string.

Starting the lesson

Ask the children how they got to school today. Some may have walked and some come in a car or on the bus. Ask them about the things they saw moving as they came to school. Write their responses on the board. These may be just the names of vehicles – car, lorry or motorbike – or a more detailed description such as someone pushing a pram. Take the children outside to watch movement along a nearby street. Point out that vehicles and people may speed up or slow down or may change direction as well as just moving forward. When you return to the classroom add your extra observations to the list already there and remind the children of what they have seen.

Activities with pages 4 and 5

- Read the introductory sentence with the children and ask them what they like best about a playground.
- Read the first sentence with the children and then let them just look at the pictures. Ask the children about the ways they can see children moving in the pictures – sliding,

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climbing, swinging and going round and round. Ask the children which is their favourite and perhaps produce a pictogram of their results.

- Move onto the last sentence on page 4 and then ask the children to mime pushing or pulling something.
- Look at the left picture on page 4 and read the caption with the children. Ask them if the girl is pulling or pushing herself to get her moving down the slide. Look for an answer about pushing.
- Look at the right picture and read the caption then move to the pictures on page 5 and read their captions too. Ask the children to find out more about the merry-go-round by looking it up in the glossary.
- Tell the children that they are going to make model playgrounds. Show the children the models you have made and if appropriate demonstrate making some more.
- Issue the materials described in the resources section to the groups of children and their helpers and let them make their model playgrounds.
- When the playgrounds are complete give out small balls of modelling clay and tell the children to make a person to try the equipment they have made. Give them 3 cm x 2 cm piece of cardboard to serve as a mat to help the person go down the slide.
- Let the children explore their playgrounds with their models and identify when they are pushing or pulling their models.

Differentiation

Less confident learners will need help making their playgrounds and identifying pushes and pulls. More confident learners may like to decorate the sides of the swing and slide or the top of the roundabout.

Assessment

The children could be assessed on their playgrounds and the way they demonstrate when a push or a pull is being applied.

Plenary

Let the children display their playgrounds on a table. Ask the children to answer the question on page 5 and look for answers which include up and down, backwards and forwards and round and round. Also ask them to demonstrate when they make fast or slow movements with the swing or roundabout. Ask them to identify when the swing changes direction and point out that the person on the roundabout is always changing direction as the roundabout is pushed.

Outcomes

The children:

- Know that there are many sorts of movement.
- Know that movement can mean changing direction.
- Know that movement can mean speeding up or slowing down.
- Can follow instructions to make simple models.

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How we move

Objectives

- To know that we move our bodies in many different ways.
- To perform a sequence of different movements.

Resources and preparation

The hall or other large space.

Starting the lesson

Ask all the children to sit still with their hands in their lap and show them how to sit. Ask them what part of their body moves when they stand up. Expect answers such as straightening the legs then ask the children to stand up slowly and think about the parts of the body that are moving. They should realise that they tip their bodies forward then push with their feet on the floor as they straighten their legs. They may even move their hands to their knees and push on them as they rise. If the children do not believe this let them try again and note that they tip their bodies forwards as they sit down.

Activities with pages 6 and 7

- Take the children into the hall or another open space and ask them to sit down with their books.
- Read the opening sentence with the children and remind them of the actions involved in the simple task of standing up.
- Read the next sentence with them and ask the children to get up and walk about and feel how their body moves. They should feel their foot push on the ground before it leaves it and the upper part of the leg pull and swing the leg forwards. You could ask the children to walk slowly backwards and feel the pushing of the foot and pulling of the leg.
- Let the children sit down and discuss walking then read the next sentence about running and look at the top photograph and caption. Let the children run and feel how their body moves. They should realise that they take larger strides when they run and that both feet may be off the ground at the same time.
- Let the children sit down and discuss running. Then read the next sentence and let the children lift their arms. First let them raise their arms from their side and then from the front. Let them raise their bent arms above their heads and then stretch them upwards.
- Read the next sentence and let the children hop. Let them feel the push of their feet and the movement of their body as they try to stay balanced.
- Let the children sit down and read the line about swimming. Look at the picture and caption about swimming. The children may like to mime swimming on the floor.

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- Go through the rest of the pictures and captions. Ask the children to find out about hopscotch in the glossary. Show the children how they can skip along without a rope.
- Ask the children to answer the question on page 7 and then work in small groups to put a sequence of movements together such as walk–run–jump–walk–hop–walk–skip and to rehearse their movements.

Differentiation

Less confident learners will need help in working out a sequence and should only make a short one that they can remember. More confident learners may make a longer sequence.

Assessment

The children could be assessed on their readiness to take part in the movements and the way they worked in a team and performed their sequence of movements. There is an assessment sheet at the end of this guide (page 51).

Assessment guidance

1. Hopping, running, jumping, crawling, rolling.
2. Run and walk, kick.

Plenary

Let each group of children perform their sequence of movements.

Outcomes

The children:

- Know that we move our bodies in many different ways.
- Can perform a sequence of different movements.
- Can work in a group to complete a task.

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Muscles and moving

Objectives

- To know that muscles move our bodies.
- To be able to locate some muscles under the skin.

Resources and preparation

A mirror for each child or each pair of children.

Starting the lesson

Ask the children if they can remember the parts inside the body that hold the body up and stop it being like a floppy bag of jelly. Look for an answer about bones. Ask the children if they can remember any of the names of bones from when they studied the body in Science@School book 1A Ourselves. Tell them that a skeleton of bones cannot move on its own so all scary stories involving dancing skeletons cannot be true. You need muscles on bones to make them move. Ask the children what they can remember about muscles from their earlier work and tell them they are going to check out their ideas.

Activities with pages 8 and 9

- Read the sentences on page 8 and then feel the muscles in the arms and legs. Let the children feel their muscles in their upper arms at the front (the biceps) and the upper arm at the back (the triceps).
- Let the children straighten their right arm and stick their fingers in the biceps then raise the lower arm. They should feel the muscle getting harder as it pulls the lower arm upwards.
- Let the children keep their legs bent as they are sat down and stick their fingers in the muscles on the top of their upper legs. Tell them to raise their lower legs and feel for changes in the muscles in the upper legs. They should feel the muscles becoming harder as they pull up the lower leg.
- While the children are still sitting down let them feel their calf muscles as they keep their feet flat on the ground and then raise them onto their toes.
- Let the children look at the photograph on page 8 and read the caption and tell them that the muscles in your face make you frown too and allow you to pull funny faces.
- Give the children the mirrors and tell them to smile and frown, raise and lower their eyebrows and pull their lower lip over their upper lip. Tell them that all the faces they are pulling are because the muscles are pulling at their skin. Let them make a drawing of their silliest face.
- Move on to page 9 and look at the top picture and read the caption with the children. Tell the children that the muscles that make the fingers grip are

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in the lower arm and when they flex and straighten their fingers they can see the muscles (actually the tendons connected to the muscles) moving under the skin.

- Look at the lower picture and let the children feel their muscles in the upper arm again and their shoulder. Let them feel the muscles in their shoulders change as they raise and lower their arms.
- Ask the children to answer the question on page 9.

Differentiation

Less confident learners may need help in locating their muscles. More confident learners may feel their legs as they walk along slowly and feel how the muscles change.

Assessment

The children can be assessed on the ease with which they find their muscles and the accuracy of their funny face drawings. They can be assessed on the number of different ways they can get up from the lying down position.

Plenary

Remind the children about the different movements they made in the last lesson and ask them to lie down and see how many ways they can use their muscles and bones to get up.

Outcomes

The children:

- Know that muscles move our bodies.
- Are able to locate some muscles under the skin.

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Pushing

Objectives

- To know that pushing something can make it move.
- To know that pushing something can make it speed up.
- To know that pushing something can make it stop.
- To know that pushing something can make it change direction.
- To know there are many different words which describe a push.
- To know that pushes may be weak or strong.

Resources and preparation

Each group of children will need a large toy car (about 18 cm long) which can move easily, three strips of cardboard about 14 cm by 4 cm, a red, a green and a blue pen, pencil or crayon.

Starting the lesson

Divide the class into groups of three or four and ask them to sit in a line on the floor. Give a child at one end of the line the toy car. Tell them that the first person is going to give the car a gentle push, the second person is going to give it a stronger push the third person is going to give it a gentle push from its side and the last person is going to push the car from the front. Tell the children that when scientists do experiments they repeat them to check their results so the children should try their experiment five times. When they have finished ask for their observations and look for the gentle push got the car moving, the stronger push speeded it up, the push from the side made it change direction and the push from the front made it stop or go backwards (change direction again) and stop.

Activities with pages 10 and 11

- Read the introductory sentence with the children and review what happened when they pushed the car.
- Read the paragraphs with the children and ask them to mime squeezing, pressing, punching, tapping and squashing.
- Look at the picture of the pram and read the caption. Ask the children what people push in a supermarket and look for an answer about a shopping trolley.
- Move on to the second photograph and read the caption. Ask the children to slowly mime biting and think about their teeth pushing down on their food.
- Read the caption about holding the sandwich then ask the children if they squash their fingers together when they pick up anything else. Let the children pick up pens and pencils and feel how they squash their fingers together to grip them.

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- Move on to page 11 and look at the top picture and read the caption. Let the children go over to the computer and check that they push down when they move a computer key.
- Look at the second picture and read the caption. Let the children examine handles on the classroom door and on cupboard doors to find handles similar to the one in the picture. Let them push down on it to open the door.
- Look at the bottom picture and read the caption. You may use this opportunity to talk about the importance of cleaning teeth.
- Ask the children to answer the question by miming the answer. They should find that a kick is a push.

Differentiation

Less confident learners may need help in remembering what they should do to the car in their line. They could make drawings of how the car changes as it received its pushes. More confident learners could change places in their line and see if they got the same results as in their first five tests.

Assessment

The children could be assessed on the way they worked together and made their observations. Less confident learners could be assessed on the way their drawings recorded their observations. (A faster moving car could have 'go faster' lines streaking behind it as in cartoons).

There is an assessment sheet for use after the children have completed lessons 4 and 5 at the end of this guide (page 53).

Plenary

Tell the children they are going to investigate the strength of a push and give out the cardboard strips and coloured pencils. Show them how to fold the card 3 cm from one end so that it can stand up. These are going to be distance markers so to make them easily seen ask the children to colour one red, one green and one blue. Let them set the markers out at about a metre, two metres and three metres from a line where the car will be released after a push. Let the children experiment with pushing the cars and see if they can become experts at pushing each car so that when it is released it goes to the selected marker. Review the results with the children or have a competition then conclude that a weak push makes the car travel a small distance while a strong push makes it go further.

Outcomes

The children:

- Know that pushing something can make it move, speed up, change direction or stop.
- Know there are many different words which describe a push.
- Know that pushes can be weak or strong.

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Pulling

Objectives

- To know that a pull can make something start to move.
- To know that a pull can make something move faster.
- To know that a pull can make something change direction.
- To know that a pull can make something stop.
- To know that there are many words for pull.

Resources and preparation

Each group of children will need a toy car, a piece of string about 40 cm long, sticky paper, scissors, modelling clay, soft tissue paper.

Starting the lesson

Give out the cars, string, sticky paper and scissors and ask the children to stick one end of the string to the bonnet of the car. Ask one child in each group to place the car on the floor and gently pull the string so that the car starts moving. Now ask them to pull more strongly and then to pull the string from one side of the car and finally to pull it from behind. Let all the children in the group try this activity five times and then discuss their observations. They should find that a gentle pull makes the car move, a stronger pull makes it go faster, a pull from the side makes it change direction and a pull from the back stops the car.

Activities with pages 12 and 13

- Read the introduction with the children.
- Read each of the sentences with the children and then get them to mime picking things up, lifting things with two hands, carrying things (stress that if they did not keep pulling up on the object it would fall), dragging things (the pull directed from the ground), stretching things, tugging things (pulling horizontally), ripping things.
- You may also give the children some modelling clay to stretch and some soft tissue paper to rip.
- Look at the top picture with the children and read the caption. Ask the children about the objects around the classroom they could pick up with a finger and thumb and after their suggestions, if you agree, let them try them.
- Look at the lower picture and read the caption. Ask the children about other vehicles that are pulled and look for answers such as trailer, caravan, broken down car.
- Move on to page 13, look at the top picture and read the caption. Ask them about their experiences of riding on a sled.

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- Look at the picture about lifting and read the caption. Ask the children about examples of lifting at home. They could be lifting a baby (like the one in the photograph), lifting up a pet rabbit or guinea pig, lifting knives and forks when having a meal.
- Look at the picture of the boy and read the caption. Ask the children what the boy may be tugging. Answers may include tugging a cart, taking part in a tug of war, tugging a boat or tugging a farm animal to get it to move.
- Ask the children to answer the question and look for an answer about pulling on socks. If the children are not sure, let them take their socks off and put them back on again.

Differentiation

Less confident learners may need help in remembering the sequence and help with observing the change in the car's movement. More confident learners could move their car in a figure of eight, make it go backwards or make it go from side to side.

Assessment

The children could be assessed on the way they handled the car. They could all make a drawing of the line of cars and colour them in and be assessed on the quality of their observations. There is an assessment sheet for use after the children have completed lessons 4 and 5 at the end of this guide.

Assessment guidance

1. pushing
2. pulling
3. pulling
4. pushing
5. pulling
6. pushing

Plenary

Let one child attach their car to the back of another with the other end of the string and sticky paper. See if when the first car is pulled the second car is pulled along too. Let another car join the queue and another until all the cars are in line. Let the children take turns at pulling them. There may be some stops for repairs to broken connections.

Outcomes

The children:

- Know that a pull can make something start to move, move faster, change direction, slow down and stop.
- To know there are many words for pull.

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Stopping

Objectives

- To know that moving things can stop slowly.
- To know that moving things can stop quickly.
- To know that large moving things are hard to stop.
- To know that small moving things are easy to stop.

Resources and preparation

Access to school hall or other open space. Each group of children will need a piece of stiff cardboard to act as a ramp, wooden blocks (or similar) to raise one end of the ramp to about 4 cm and then to about 11 cm, three dominoes, a large toy car and a small toy car, a lump of modelling clay about 2 cm in diameter. A copy of the latest official advice for crossing the road safely.

Starting the lesson

Take the children into the hall and tell them to walk around and that they must stop moving as soon as you clap your hands. Let the children begin moving and then clap your hands. Point out that they should have stopped mid stride and not put their feet together. Let them try again. Let them run, skip, hop or crawl then clap your hands. Try a few times and ask the children which people stopped most easily. Draw them to the conclusion that it was those people moving slowly. The children should realise that those moving more quickly took longer to stop.

Activities with pages 14 and 15

- Read the introduction and review the children's work in starting the lesson to confirm the statement.
- Read the first and second sentences then move across the page and look at the boy with the ball and read the caption.
- Issue the ramp, blocks, dominoes and toy cars. Tell the children to set up the ramp with one end about 4 cm (or a small height) above the floor. Let the small car go down the ramp and mark the position where the front reaches by putting a domino to one side where it will not be knocked over by the second car. Repeat with the large car. Tell the children they must act like scientists and make two more tries with each car. They can then make a drawing of their observations. They should conclude that the larger car takes longer to stop and travels further before it stops.
- Look at the picture on page 14 with the children and read the caption.
- Tell the children that they can measure how easy it is to stop a toy car by seeing how many dominoes it knocks over. Let the children set up three dominoes in front of the ramp.

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They should be spaced so that when one falls over it does not knock into the next one and knock that over too. Let the children release the small car from the ramp and note how many dominoes it knocks over (it may be just one). Let the children repeat the experiment with the larger car and they may find that it knocks over all three dominoes before it stops. Let them repeat each experiment twice more and then make drawings of what they observed.

- Ask the children what might happen to a person who was struck by a small vehicle and a person who was struck by a large vehicle. Tell them that they can test their ideas by making a person from modelling clay and placing it about 10 cm from the bottom of the ramp then let each car in turn roll down the ramp and strike it. They should find that the small car just knocks over the person while the larger car may run over it a little. Let the children repeat their experiments and record their observations with drawings.
- Look at the top right picture on page 15 and read the caption with the children. Ask the children how they could make their toy cars go faster without pushing them and look for an answer about making the ramp steeper. Let the children raise one end of the ramp to about 11 cm and test the cars. They should find that they go further. Ask what might happen to the person if they were put in the way of the cars and look for an answer about showing signs of injury. Let the children test their ideas and they should find that when the steeper ramp is used the small car may run over the person a little more and the larger car runs over the figure and bends it. You must stress that a small car can inflict serious injuries but large vehicles like the lorry in the picture can inflict even worse. Both are capable of inflicting fatal injuries so all vehicles should be treated with the same amount of care.
- Look at the traffic lights and read the caption then ask the children which picture shows the lights telling the cars to go.
- Ask the children to answer the question on page 15 and compare their answers with the latest official advice.

Differentiation

Less confident learners may need help in marking the positions that the cars travel and in making their drawings. More confident learners could find out how many dominoes are needed to stop the cars when they are released from the steeper ramp. They could add labels to their drawings.

Assessment

The children can be assessed on the care they take in making their investigations and on the quality of their drawings.

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Plenary

Review the children's experimental work and let them display their pictures. Emphasise the danger of all vehicles on the road and make sure that the children know the safe way to cross a road.

Outcomes

The children can:

- Know that moving things can stop both slowly and quickly.
- Know that large moving things are harder to stop than smaller moving things.
- Record their investigations in pictures.
- Know the correct way to cross a road.

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Changing speed

Objectives

- To know that moving objects can change their speed.
- To develop observational skills.

Resources and preparation

The school hall or other open space, a bicycle, a classroom assistant. Each group of children will need a long wide piece of thin card (or a few pages from a broadsheet newspaper with the long sides folded over and stuck with sticky tape to make a wall), two piles of books or blocks to make a support at each end of the card 12 cm high, a marble, or small wheeled vehicle that runs very freely.

Starting the lesson

Ask the children to stand up and move as slowly as they can, ask them to imagine that they are creeping up on someone. Now ask them to move a little faster until they are walking normally. Ask them to walk quickly and then to run, then to walk and stop. Develop the exercise by getting the children to creep, run, creep, walk, run, walk, creep. Let the children break into groups and take turns at shouting orders for the others in the group to obey.

Activities with pages 16 and 17

- Read the introduction and the first two sentences with the children and then remind them about their activities at the start of the lesson.
- Ask them when they speeded up and look for answers about changing from creeping to walking, walking to walking fast, walking fast to running. Ask them about when they slowed down and look for answers about changing from running to walking fast, from walking fast to walking, from walking to creeping.
- Read the third sentence, look at the photograph with the children and read the caption.
- Wheel in the bicycle and show the children the brake handle and the tube connecting it to the brakes on the wheel. Tell the children that inside the tube is a wire and when you press on the brake handle it pulls the wire, and the brakes press against the wheel. Demonstrate this action.
- Raise the front wheel so that it can spin freely. Get your assistant to spin the wheel, then ask the children what might happen when you press on the brake handle, then do it. Repeat the exercise until all the children have seen the brakes work.
- Move on to page 17 and look at the pictures and read the captions with the children. Ask the children to find out more about the roller coaster by looking in the glossary on page 23. You could use this opportunity to let them tell you about their experiences on fairground rides.

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7 Teacher's sheet 1E

- Consider the question with the children and say that they can make a model of the bottom half of a roller coaster to find out. Demonstrate how to set it up by putting the piles of books or blocks about 30 – 40 cm apart. Bend the card or paper to make a shallow U shape and place each end on the supports. (It should look like the curved ramps seen at a skateboard park.)
- Let the children make their models then give out the vehicles or marbles and let them set them at the top of one part of the ramp and let go. The object should move with increasing speed to the bottom and with decreasing speed up the other side. It should then move back and may oscillate between the two sides of the ramp for a short time.
- Let the children repeat their experiment a few times and then ask them if they have found an answer and look for someone saying that you slow up as you go up a roller coaster and speed up as you come down.

Differentiation

Less confident learners may need help in calling out their instructions. They could write them down first and then read them out. More confident learners may like to add crawling or walking on tip toe to the repertoire and see where they fit in (crawling before creeping and walking on tiptoe after creeping). They may attempt to put a small hump in the ramp, especially if using paper, to make a roller coaster with one hump.

Assessment

The children can be assessed on their ability to follow instructions and to give them. They could be assessed on making their model and could be asked to produce a picture of it, marking the places where the vehicle or marble speeded up and slowed down.

Plenary

Review the children's work starting with the activity in the hall, the action of the brakes on the bicycle and changing speed on a roller coaster. Tell them that people can sometimes injure themselves if they change speed suddenly. For example they can sometimes slip and fall as they start to run or stop running and remind them to take care to stay safe.

Outcomes

The children:

- Know that moving objects can change their speed.
- Can make observations on moving objects and detect when they change speed.

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8 Teacher's sheet 1E

Wind and water

Objectives

- To know that wind causes movement.
- To know that moving water can cause other things to move.
- To compare a fair and unfair test.
- To provide captions for pictures.

Resources and preparation

Each child will need a strip of tissue paper about 2 cm x 10 cm. Each group of children (and yourself) will need a large bowl (preferably shallow), a model boat made from the plastic tray in which roasted chickens are sold (it has a pointed end), a sail and mast made from cutting an A4 sheet of paper in half and sticking it with sticky paper to a plastic straw. The end of the straw is then mounted in the middle of the tray with modelling clay. You will need a balloon pump, a piece of plastic guttering inclined at a small angle with a bucket at the lower end, a jug of water, small pieces of plastic straws, two water wheels each one made from a round pencil with a round lump of modelling clay moulded around its middle (about 3 – 4 cm in diameter). The first water wheel has four plastic strips (the paddles or blades) about 3 x 2.5 cm (cut from a plastic tray in which sliced meat is packed) and the second has eight plastic strips, access to a tap and sink.

Starting the lesson

Give each child a strip of tissue paper and ask the children to hold them up and move them without shaking their hands or touching them with their other hands. Watch and wait for someone to blow their strip of paper. Let all the children blow their strips. Tell the children not to blow too hard or too frequently. Ask them if the paper always moves in the same way when they blow and look for an answer about it only moving a little when they blow gently but moving almost horizontally when they blow strongly. Ask them to look outside and predict what might happen to their paper if they went and held it up in the playground. Let them check their predictions but tell them to hold on tight to their paper strip if it is windy.

Activities with pages 18 and 19

- Read the introductory sentence with the children then move on to the first sentence. Ask the children to find out more about kites by looking in the glossary and then talk about their experiences of flying kites or having seen kites flown.
- Look at the picture of the flag and read the caption with the children. Ask them to make their strips of paper flutter and look for the children blowing gently.

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8 Teacher's sheet 1E

- Move on to the last sentence then look at the picture of the ship on page 19 and read the caption.
- Ask the children if the size of the sail might affect how the ship is moved along by the wind. Look for an answer about a large sail being better, then ask the children how they may test their idea with model boats.
- After the discussion present the children with their bowls of water and model boats. Ask them to blow the boat to each other across the bowl.
- Ask your teaching assistant to go round each ship and cut some of the sail from each side of the mast then let the children blow again.
- Repeat the last step several times until the sail is small.
- Ask the children what they discovered and look for an answer about as the sail got smaller it got harder to blow.
- Ask the children if they all blew with the same strength and look for an answer about some children blowing harder than others. Tell the children that in science tests must always be fair and you are going to perform a fair test using a balloon pump.
- Let them gather round to watch you repeat their test with the balloon pump and confirm that a ship with a large sail is blown more quickly and farther than a ship with a small sail.
- Let the children make drawings of ships with large and small sails and write the caption 'This ship will go fast in the wind' and 'This ship will go slow in the wind'.
- Look at the picture of the canoeist and ask the children to find out more by looking for canoeist in the glossary.
- Tell the children that you are going to make a model river and give them model canoes to see if water really does move canoes along. Give each child a small piece of plastic straw (their canoe) and let them gather around the guttering. Pour water into the raised end of the guttering and make a slowly moving river. Invite the children in turn to put their canoes in it and see what happens. They should conclude that the water carries their canoes along.
- Return to page 19 and look at the picture of the waterwheel and read the caption with the children. Ask the children to find out more about waterwheels in the glossary on page 23.
- Show the children your model waterwheel with four blades and ask them what might happen if you put it under a running tap. Try and show the children that the waterwheel only turns a little because it is not catching much water to push it.
- Show the children the waterwheel with eight blades and ask them to predict what will happen. Test their prediction and discover that the waterwheel moves much faster.

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8 Teacher's sheet 1E

Differentiation

Less confident learners may need help in noticing the strips blow at different heights and that the ship moves more slowly when it has a smaller sail. The captions could be written out for them to cut out and paste under the appropriate drawing.

Assessment

The children can be assessed on their discoveries with the paper strips and the way they worked as a group with the ships. They can be assessed in the quality of the drawings and their ability to provide the correct captions for them.

Plenary

Read the question on page 19 and look for an answer about the leaves fluttering, the twigs swaying, whole branches swaying and being broken off and whole trees being blown down. Move back to page 18 and read the second sentence, look at the lower picture and read the caption. Read the last sentence about moving water and talk about powerful waves at the seaside washing down cliffs and strong currents in rivers washing away river banks. Conclude that wind and water can provide gentle and very strong pushes.

Outcomes

The children:

- Know that wind causes movement.
- Know that moving water can cause other things to move.
- Can compare a fair and unfair test.
- Can provide captions for pictures.

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Movement and play

Objectives

- To know that pushes and pulls are used when children play.

Resources and preparation

The three favourite toys (see 'Starting the lesson'), jack-in-a-box, sand tray, bucket and spade, a string puppet. Each child or group of children will need bubble mixture (shop bought or made by mixing two tablespoons of washing-up liquid with a cup of water and leaving for two days) and wire hoops (about 2 cm in diameter). A selection of toys for all the children to play with. Classroom assistants.

Starting the lesson

You may like to use the first piece of this section a day or two before the lesson to give you time to arrange for the favourite three toys to be present in the lesson.

Ask the children to name ten toys. Look for answers, which include vehicles and their trailers, trains, models such as knights with moving limbs, dolls, toy keyboards. Ask them about other play things such as bats and balls, skittles, garden darts, sand trays. Make a survey to find the favourite toys with each child telling you or your classroom assistants privately their three favourite toys. Produce a class pictogram and try and arrange for the favourite three toys to be brought in later to be examined.

On the day of the lesson you may like to start it this way. Tell the children that when we play we use pushes and pulls. Just pick up a ball and throw it to one of the children. Ask the class to identify any pushes and pulls you made and look for an answer about lifting (pulling) up the ball and throwing (pushing) the ball through the air.

Activities with pages 20 and 21

- Read the opening sentence with the children and remind them of the push and pull you have just made with the ball.
- Read the first paragraph, look at the jack-in-a-box and read the caption. Ask the children to find out more in the glossary on page 22.
- Show the children a jack-in-a-box and demonstrate how it works – showing how you push on it to put it in the box and how it pushes out of the box when you open the lid.
- Read the second paragraph, look at the picture of the sand and read the caption with the children. Ask for a volunteer to build a sandcastle in the sand tray. Invite the others to say when the volunteer is pushing or pulling. Their observations can begin by the pulling up of the bucket and spade when lifted into the sand tray. The spade can be seen to be pushed into the sand then pulled up to put

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the sand in the bucket. The sand may be pushed and pulled about to make a base on which to build the castle. The bucket is pulled up, turned over and pushed down then pulled up again to display the castle.

- Move on to page 21 and look at the picture and caption about the train. Ask the children what other toys are pushed along and look for an answer about cars.
- Move on to the picture and caption about the string puppet and demonstrate how the strings are pulled in a puppet to produce movement. Let the children mime being string puppets and identify when their limbs are pulled up.
- Look at the picture about bubbles and read the caption with the children. Take the children outside and give out the bubble mixture and the wire hoops. Let them blow bubbles and realise that they are pushing air into a soap film to make a bubble. Point out that the air they have pushed out when they blew keeps moving and takes the bubble with it. If there is a breeze point out that the wind can push the bubbles along too.
- Ask the children to read the question and then play with the selection of toys provided.

Differentiation

Less confident children may need help identifying when their bodies are pushing and pulling. They could look at a small selection of toys and identify when they push or pull on them. More confident children could look at a wider range of toys and identify when they push and pull them. They could make wider and narrower wire hoops and see if they could blow bubbles in them.

Assessment

The children could be assessed on the quality and frequency of their observations. There is an assessment sheet for the children to use after they have completed the book at the back of this guide (page 55).

Assessment guidance

1. pushing
2. pulling
3. wind
4. muscles
5. speed up
6. slow down

Plenary

Remind the children about their survey of favourite toys and produce them for the class to see. Show the children the pushes and pulls that are made when the toys are played with. Ask the children to think about the pushes and pulls they make as they tidy away the toys in the classroom.

Outcomes

The children:

- Know that pushes and pulls are used when children play.

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Assessment

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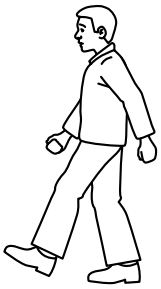
Name: .....

How we move

1. How many different ways do we move?

Draw and write about the different ways in each of these boxes.

The first has been done for you.

a.	b.	c.
 walk		
d.	e.	f.

2. How do you move when you play football?

.....

.....

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Assessment

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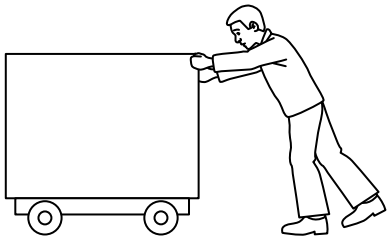
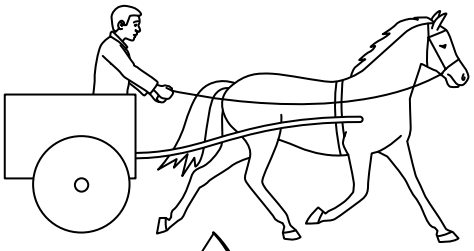
Name: .....

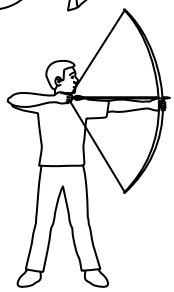
Pushing and pulling



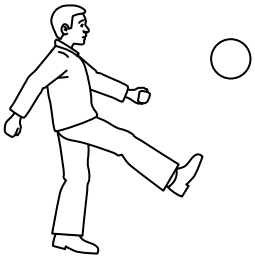
1. **Is the man**
   pushing ☐ pulling ☐ ?



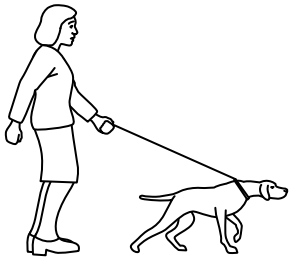
2. **Is the horse**
   pushing ☐ pulling ☐ ?



3. **Is the boy**
   pushing ☐ pulling ☐ ?



4. **Is the boy**
   pushing ☐ pulling ☐ ?



5. **Is the dog**
   pushing ☐ pulling ☐ ?

6. **Is the lady**
   pushing ☐ pulling ☐ ?

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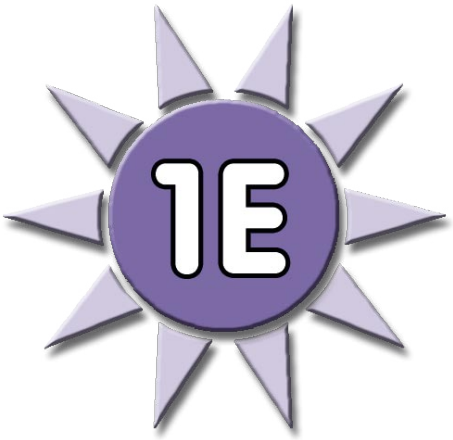

Assessment

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1E

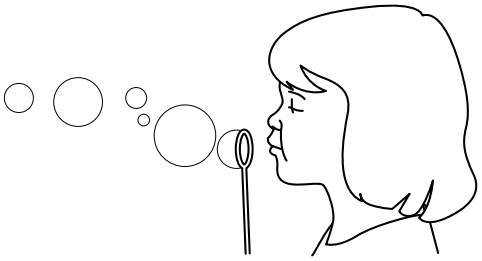
Name: .....

1E

Pushes and pulls

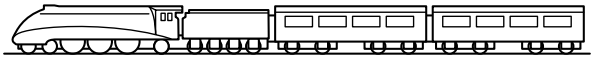
1. **This girl is blowing bubbles.**

   Is she pushing ☐ or pulling ☐ ?



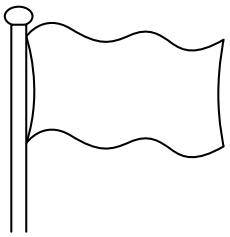
2. **Is this engine**

   pushing ☐ or pulling ☐ ?



3. **What makes a flag flutter?**

   water ☐ wind ☐ sunlight ☐

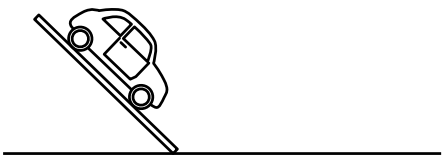


4. **What moves our bodies?**

   muscles ☐ bones ☐ skin ☐

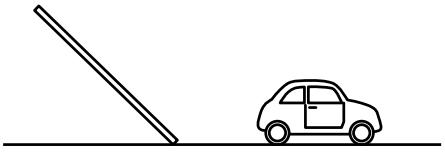
5. **This car is going down the ramp.**

   Does it speed up ☐
   or slow down ☐ ?



6. **It goes across the floor.**

   Does it speed up ☐
   or slow down ☐ ?



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