



Holly Park Learning Organiser

Year 3 - Science

Forces How does the material on the ramp affect the distance a car travels?



Prior Knowledge:

- Explore the natural world around them.
- Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

Essential Knowledge:

Children are introduced to forces for the first time. Children should define forces simply as a push or a pull. Give them opportunities to observe push and pull forces in action. Effective ways to demonstrate pull forces include pulling a door or pulling a string to open a blind. Pushing a door closed or kicking a ball are effective ways to demonstrate push forces. Children should categorise examples of a force as a push or pull and be given the opportunity to exert forces themselves. , children should be able to define forces as a push or pull, stating that the forces observed are contact forces, because they affect objects which are touching.

Key Questions:

- What is a force? • How can we describe a force? • Is kicking a ball a push or a pull force? • Is rolling a pen across the desk a push or a pull force? • What is an example of a pull force? • What is an example of a push force? • What can forces cause objects to do? • How can a push force be useful? • How can a pull force be useful?
- What is friction? • What type of surface has low friction? • What type of surface has high friction? • When is friction useful? • When is friction not useful? • What are contact forces?

National Curriculum Objectives:

- Compare how things move on different surfaces.

Key Vocabulary

push	To apply a force to try and move an object away
pull	to apply a force to try and move an object closer
force	a push or pull
Contact force	– a push or a pull that affects objects which are touching
friction	a contact force that is caused by one object being pushed across the surface of another
smooth	an even surface
rough	an uneven surface
independent variable	(what will change) – the material on the surface of the ramp
dependent variable	(what will be measured) – the distance that the car travels from the end of the ramp
control variables	what is kept the same) – the height of the ramp, the starting point of the car, the force that the car is released with and the type of car



Working Scientifically:

- Identifying differences, similarities or changes related to simple scientific ideas and processes.
- Using straightforward scientific evidence to answer questions or to support their findings.
- Setting up simple practical enquiries, comparative and fair tests.
- Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.

SEND Core Knowledge:

- To demonstrate pull forces include pulling a door or pulling a string to open a blind. Pushing a door closed or kicking a ball
 - Children should recall that forces are pushes and pulls
- Children investigate how different materials affect friction, by releasing a toy car from the top of a small ramp and measuring how far it travels on each material.

Common Misconceptions:

- Children may believe that only one force can act on an object at once. Demonstrate pushing and pulling on an object at the same time, to show this in a simple way.
- As children cannot see forces, they may find it difficult to understand their effects. Demonstrate this concept using practical examples as much as possible. • Children may believe that a stationary object does not have any forces acting on it. Explain to them that friction Key questions • What is a force? • What is an example of a push force? • What is an example of a pull force? • What is friction? • What type of surface has low friction? • What type of surface has high friction? • When is friction useful? • When is friction not useful? • What are contact forces? National curriculum links • Compare how things move on different surfaces. findings. • Working scientifically – Using straightforward scientific evidence to answer questions or to support their can prevent an object from moving.
- Children may struggle to set up their equipment. It could be useful to model how to do this, after they have discussed their plans. This extra support would help to provide context when identifying what they are changing, measuring and keeping the same. • Ensure that the toy car travels in a straight line and does not travel in a curve or angle before testing as this could affect their results.

Cross Curricular Links

Possible Texts The Iron Man (Ted Hughes), Mrs Armitage: Queen of the Road (Quentin Blake)
Mr Archimedes' Bath (Pamela Allen)

Possible Practical Activities:

Explore Forces

Give children the opportunity to push and pull everyday objects across the desk. Stationery and classroom equipment could be used for this activity. Children should identify if they have applied a push force or a pull force. • Provide images of activities such as pushing a trolley, pulling a rope, squeezing a foam ball and clicking a pen. Children should group the images as a push or a pull. • Provide children with a soft substance, such as modelling clay, and demonstrate how the shape changes when force is applied. Allow children to push and pull the clay and record their observations. Children should identify whether they have applied a push or a pull force.

Friction

Put children in small groups. Give each group of children a marble and allow them to roll it on various materials around the classroom or outside. Ask the children what they notice. Ensure that there are a mixture of smooth and rough surfaces, such as concrete, carpet, grass and wood. Children should notice that the marble rolls more quickly on a smooth surface.



Plan Friction experiment

Equipment needed • wooden ramp • toy car • ruler or tape measure • different materials to use on the surface of the ramp, such as wood, carpet or sandpaper **Practical activity** • Present children with the equipment they will use to investigate friction. Children should explore the different equipment and decide how and why each piece of equipment might be used. **Planning sentence stems** • I predict that ... I think this will happen because ... • I will change the ... • I will measure the ... • I will keep ... the same.

Investigate Friction Experiment

Method 1. Place a ramp on a table. Ensure the ramp is not too high, to prevent the car from moving an unmeasurable distance. 2. Put a strip of the material being tested on the ramp. 3. Place a toy car on the material at the top of the ramp. 4. Release the toy car. 5. Measure the distance that the toy car has travelled once it has reached the bottom of the ramp. 6. Record the distance the car has travelled in a data table. 7. Repeat the investigation but change the material on the ramp each time.