

Ashtree Primary School and Nursery Medium Term Plan for Science

Year 5 Autumn Term – Forces

Prior Knowledge – Y3 – Forces

- recognise that pushes and pulls are forces
- recognise that a force acts in a particular direction
- observe the movements, shape and direction of objects when forces act on them
- describe how to make a familiar object start moving by pushing or pulling
- describe how to use pushes and pulls to make familiar objects speed up, slow down, change direction or shape
- produce annotated drawings showing the direction of force needed to make an object move
- identify friction as a force
- observe and explore how friction affects the movement of objects
- describe some ways in which friction between solid surfaces can be increased or decreased
- classify materials as magnetic or non-magnetic
- describe the difference between a magnet and a magnetic material
- describe what happens when some materials are put near a magnet
- recall that magnets have a north and a south pole
- describe the direction of forces between magnets

Prior Skills – Y3 - Step 1 - with support, records and presents findings using drawings, labelled diagrams, keys, tally charts, Carroll diagrams, Venn diagrams, bar charts and tables, sets up simple practical enquiries, comparative and fair tests with support, asks relevant questions and uses, with support, different types of scientific enquiries to answer them, beginning to make systematic and careful observation, reports on findings from enquiries, in simple scientific language, using oral and written explanations, Using model frames for support, gathers and records data in a variety of ways to help in answering questions for changes, patterns, and relationships in their data

Key Vocabulary - force, air resistance, water resistance, magnetic attraction, gravitational attraction, direction, force, motion, weight, upthrust, Newton, forcemeter, stationary, surface area, force applied, pulley, lever, gear

Key Knowledge

- Step 1** - identify **weight** as a **force** and identify that force is measured in **Newtons** and name simple forces such as **gravity, friction and air resistance**
- Step 2** - recognise that more than one force can act on an object and observe and explore the effect of several **forces** on objects
- Step 3** - describe and explain the **motion** of some familiar objects in terms of several forces acting on them
- Step 4** - identify **forces** on an object as either balanced or unbalanced and use the terms '**balanced**' and **unbalanced**' when describing several forces on an object
- Step 5** - explain that balanced forces on an object cause it to remain stationary or travel at the same speed and explain that unbalanced forces on an object cause it to speed up, change shape or slow down
- Step 6** - understand that **air resistance** is the frictional force of air on objects moving through it and recognise that air resistance slows things down (**gravitational attraction**)
- Step 7** - describe some of the factors that increase friction between solid surfaces and increase **air** and **water resistance** (**upthrust, surface area**)
- Step 8** - describe situations in which **frictional forces** are helpful as well as those in which frictional forces are unhelpful
- Step 9** - **recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.**

Key Skills

- Step 1** - records and presents findings using drawings, labelled diagrams,
- Step 2** - records and presents findings using drawings, labelled diagrams,
- Step 3** - sets up simple practical enquiries, comparative and fair tests
- Step 4** - identifies differences, similarities or changes related to simple scientific ideas and processes
- Step 5** - sets up simple practical enquiries, comparative and fair tests
- Step 6** - sets up simple practical enquiries, comparative and fair tests

Curriculum Enhancements

Have a range of different mechanisms for children to investigate or build themselves. Create competitions for the flying machine which stays in the air the longest or a water vessel which can hold the most weight.



Suggested Activities

S1 – Revisit prior learning about forces in Year 3.

S2 – describe some situations in which there is more than once force acting on an object and draw force diagrams with arrows showing the direction of forces acting on an object.

S3 – Investigate how objects move when different forces are applied to them.

S4 – Make predictions about what would happen to an object if balanced or unbalanced forces are applied to them. Investigate their predictions.

S5 – Look at the results from the previous step's investigation. Explain what happens to an object when the forces are balanced or unbalanced.

S6 – Investigate air resistance and link to their prior knowledge of friction. Use this knowledge to design a parachute or a flying machine.

S7 – How can friction be increased? Investigate increasing the friction on an object. How can water resistance be increased?

S8 – Why is friction useful? When is it not useful? Look at different scenarios and identify where friction is occurring and whether it is useful or not.

S9 – Look at different mechanisms (in real life if possible) and ask the children how they work and where the forces are in action. Why use these mechanisms?

Possible Misconceptions

Some children may think:

- the heavier the object the faster it falls, because it has more gravity acting on it
- forces always act in pairs which are equal and opposite
- smooth surfaces have no friction
- objects always travel better on smooth surfaces
- a moving object has a force which is pushing it forwards and it stops when the pushing force wears out
- a non-moving object has no forces acting on it
- heavy objects sink and light objects float.

This will lead to . . . KS3 – Forces

- Forces as pushes or pulls, arising from the interaction between two objects. (KS3)
- Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces. (KS3)
- Moment as the turning effect of a force. (KS3)
- Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water. (KS3)
- Forces measured in Newtons, measurements of stretch or compression as force is changed. (KS3)