Question: Can you feel the force? How important are forces in our lives?

National Curriculum Link
Science Y5: Forces
KS2 Science Working Scientifically

IB Learner Profile Links

Inquirers – Nurture skills for research and curiosity

Knowledgeable – Develop conceptual understanding and engage with issues and ideas

Thinkers – Use critical and creative thinking skills

Reflective – Consider the wider world and our own ideas and experience

Risk-takers – approach uncertainty with forethought and independence

Prior Skills – Y2	**Prior Skills – Y3**	**New Skills – Y5**
• Understand that forces make things move. • Know that forces are pushes and pulls and make things speed up and slow down. • Recognise that when things speed up, slow down or change direction there is a cause. • Describe how things move at different speeds, speed up and slow down, using simple comparisons, comparative vocabulary and superlative vocabulary. • Ask questions and decide how they might find answers to them. • Use simple scientific language to communicate ideas and describe phenomena. • Make simple predictions based on a previous experience or learning • Make observations linked to the test and record results in a table with support • Learn that it is important to collect	• Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance • Observe that magnetic forces can be transmitted/act without direct contact unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing). • Observe how magnets attract or repel each other and attract some materials and not others • Classify which materials are attracted to magnets and which are not? • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet • Identify some magnetic materials • Describe magnets as having two poles (N & S) • Predict whether two magnets will attract or repel each other, depending on which poles are facing.	• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces • Describe and explain how motion is affected by forces (including gravitational attractions, magnetic attraction and friction) • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. • Plan and set up a simple fair test to make comparisons • Plan a fair test and isolate variables and explain why it was fair and explain which variables have been isolated • Suggest improvements and predictions linked to questions • Decide which information needs to be collected and decide which is the best way for collecting it

evidence by making observations when trying to answer a question. • Review their work and explain what they did to others. • Communicate findings in a variety of ways • Draw conclusions (find an answer to the question) from results and observations	• Use different ideas and suggest how to find something out • Make and record a prediction before testing • Plan a fair test and explain why it was fair • Set up a simple fair test to make comparisons • Explain why they need to collect information to answer a question • Report on finding from enquiries in a variety of different ways. • Use scientific evidence to draw conclusions to answer questions • Identify simple patterns from observation and data base on everyday experience.	• Use their findings to draw a simple conclusion • Take repeated measurements for accurate results

Knowledge, Skills and Understanding for topic area

- Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
- Identify the effects of air resistance, water resistance and friction, that act between moving surfaces
- Describe and explain how motion is affected by forces (including gravitational attractions, magnetic attraction and friction)
- Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

Knowledge, Skills and Understanding for Working Scientifically

- Plan and set up a simple fair test to make comparisons
- Plan a fair test and isolate variables and explain why it was fair and explain which variables have been isolated
- Suggest improvements and predictions linked to questions
- Decide which information needs to be collected and decide which is the best way for collecting it
- Use their findings to draw a simple conclusion
- Take repeated measurements for accurate results

Challenge

- Can they design very effective parachutes and explain the effectiveness of their design?
- Can they work out how water can cause resistance to floating objects?
- Can they explore how scientists, such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation?

Resources

- pictures showing springs and magnets to illustrate forces or magnets and springs
- force meters with a range of 0-10N
- objects which can be suspended from force meters and immersed in water
- tall cylinder or other tall transparent container for water
- plasticine – to shape into different shapes
- timers capable of reading to 0.1 second
- large sheet(s) of card
- material/paper for parachutes
- string
- paper parachute
- secondary sources *E.g. CD-ROM or video showing moon walking and with information about gravity on Earth and on the Moon*

Suggested Quality Texts

Non-fiction: Internet research based on key scientists linked to topic: Sir Isaac Newton and Galileo Galilei
Resource books in topic boxes

Website/Apps

All forces explained
http://www.racemath.info/key_stage_menus/key_stage_2.htm
Teacher TV and BBC learning clips for teacher background and useful clips
Follow this link for a short movie clip of Astronauts weightless in space
http://www.nas.nasa.gov/About/Education/SpaceSettlement/Video/freefall.mpg
Shows all objects would fall at the same rate without air – in space demo hammer and feather fall at the same speed.
http://nssdc.gsfc.nasa.gov/planetary/lunar/apollo_15_feather_drop.html

Extended Writing Opportunities

Create an information leaflet/ non chronological report about forces. An explanation text about the importance of friction in our lives; the advantages and disadvantages of friction in your life.

Numeracy Skills

Standard units; minutes, seconds, m, cm. Time: measuring time on a stopwatch. Data handling : Drawing frequency tables and different graphs, bar and line graphs. Graphing software or spreadsheet. Use to draw Bar charts 1:1, 1:2, 1:5 & 1:10 scale.

Wow starter/experience

Watch a video clip of an astronaut floating in space in the immersion room and other examples which link to forces. E.g. a falling parachute

Cross Curricular Links/ enquiry time activities:

DT/Literacy: Children should design and make a structure from any chosen material with levels to make something move. Write a set of instructions for how to make a bridge/structure.

Literacy: Make a cartoon strip to illustrate a sinking story with scientific captions.

DT: Design and make a bath toy that floats. Consider materials to be used—glues and paints need to be waterproof. Toys should have no sharp edges or splinters.

ICT: Put together a presentation to show the advantages and disadvantages of friction in your life.