Forces and Magnets: How do rollercoasters work?

Year: 3

Unit 1

Essential Prior Knowledge

Knowledge: Primary Resources Science | Reach Out CPD

Connect 4: object, material, purpose, suited

Prior knowledge to be assessed before the start of the unit:

From KS1 materials (forces not previously covered)

- The difference between a material and an object

KQ1: What is a force?

Children investigate movements as push or pull forces and identify them in the real world recording their observations. Communicate- explain the forces involved in them getting ready in the morning.

Assess: A force is a push or a pull. Most need to be touching.

Evidence: what is a force

KQ2: Do objects need the same force to move them across different surfaces?

Children will conduct a fair test and use forcemeters and different surfaces to explore and answer the enquiry, recording their method. Consider ways in which you could improve your experiment.

Assess: Verbally explain the findings. What surface did need more force?

Evidence: What do you do every day that uses rough surfaces?

KQ3: How do I record my results?

Children will create a simple tables and charts (e.g. block chart/bar charts) of results to show the amount of force needed to move objects over different surfaces and form a simple conclusion. Consider-how does weather change forces for drivers? What do they need to consider? E.g. wet roads=smoother.

Assess: Would it be easier to rollerblade on the pavement or grass?

KQ4: What is a magnet?

Magnet is described as having two poles. Use iron filings to explain attraction and the magnetic field. Explore what happens when a north pole and north pole are put together. Discuss attract and repel. Understand that attraction is a pull and repel is a push. *Misconception: the larger the magnet, the stronger it is. How do the north and south pole (of Earth) work as a magnet? How do birds use the Earth's magnetism to find directions?*

Assess: predict whether the magnets will attract or repel based on their position.

KQ5: Is everything magnetic?

Children will predict whether magnets will attract certain objects and explore and observe how magnets attract some materials and not others and make simple conclusions (metals are magnetic). Children will classify metals as magnetic or non-magnetic and draw simple conclusions about what metals must be in certain materials based on whether the object is magnetic or not. Misconception: all metals are magnetic. Consider why we might need to use non-magnetic metals? E.g. titanium in bodies so that they don't react with MRI machines.

Assess: predict whether new and different materials are magnetic or not.

Evidence: What materials are magnetic?

Essential knowledge to be retained:

A force is a push or a pull acting on another object. It can make an object move or stop.

You need less force to move an object on a smooth surface.

Most forces require contact but not all do (magnetism)

Forces are measured in Newtons

Magnets attract magnetic materials. All magnetic materials are metal (but not all metals are magnetic).

Area of enquiry	Expected level	Suggested questions
Enquiry	I can ask relevant scientific questions.	Based on what I already know, what question am I going to ask? Where might I see this in the real world? How will I find out the answer to this?
Prediction	I can make a prediction with a reason.	What do you think will happen? What knowledge do you have that makes you think this? If these are my results so far, what might my next result be?
Methodology	I can set up a simple enquiry (any type) to explore a scientific question. I can set up a fair test to compare two things. I can set up a fair test and explain why it is fair. I can make careful and accurate observations, including the use of standard units.	Why does my method need to be accurately recorded? What do we need to do to make this test fair? What do we need to keep the same? What do we need to change?
Measuring	I can use equipment, including thermometers and data loggers to make measurements. I can make careful and accurate observations, including the use of standard units. Y3 and 4 m/cm/mm, kg/g and l/ml.	What are we measuring? What is the best equipment to measure it?
Classifying	I can classify in different ways to answer scientific questions.	Can you group these based on a property you can observe? Can you justify your groups? Can you design a simple key to group these? What questions would be best for your classification key? How might this key be used? Who might use this key?
Presenting results	I can present data in different ways to answer scientific questions. I can use diagrams, keys, bar charts and tables; using scientific language to present my results. I can use findings to report in different ways, including oral and written explanations and presentations.	What is the best type of graph or table to show your results? Why?
Concluding	I can use observations and knowledge to answer scientific questions. I can draw conclusions and suggest improvements. I can identify differences, similarities and changes related to an enquiry.	What do the results suggest? How would this conclusion help in science or the wider world? How might people use these conclusions in their lives?
Validity (linked to methodology and conclusions)	I can suggest how an enquiry could have been improved with some understanding of reliability and validity shown.	Have you measured what you wanted to measure? Have you measured accurately? Would you get the same results if you did it again or if someone else did it? What needs to stay the same? Why? If you did it again, what would you keep the same? Why? How could you make this investigation ever more accurate?