Pioneer Federation
Medium term plan
lKS2- Cycle 2, Term 5
Science

Subject: Science	
Key Concept/ Theme: Forces and magnets	
Prior Learning links: This is a new area of learning however in KS1 and Early years the children will have had experience of investigating magnets and also will have had experience naming materials, identifying properties and pushes and pulls. KS1 learning covered in materials topic which they might draw knowledge from when talking about materials being used when investigating: • Distinguish between and object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, plastic, glass, water and rock. • Describe the simple physical properties of a variety of everyday materials. • Compare and group together a variety of everyday materials on the basis of their physical properties. • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	
Vocabulary: Magnets – bar and horseshoe Attract Repel North and south poles Magnetic Magnetic field	
1.	Deeper learning question for the term: How are magnets a part of our daily lives and do they all behave in the same way? Prior learning reconnection (year group, cycle & term): Materials c2 T4 and T6- see above for links to materials which will support learning of children in investigations. This session is a reconnection to KS1 materials lesson in c2 t6 where year 2 will have looked at how the surface affected the car rolling down the ramp. Enquiry skill: Fair testing LO: Let's compare how objects move on different surfaces. Activity: Start by asking the children if they think inventions need science. Can they list any inventions that they think might use forces and magnets? Show these on the board and ask them to explain how they help people in the world. Link to the Paris Olympics and show them the Vision Pad where the ball on a pad moves to help Visually impaired people experience the game- this will be important for week 6. Children to reflect and discuss the impact of this invention and record in book. Explain that this term is about

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	Magnets and forces and they will be given the opportunity to reflect on inventions in the world at the end of each session to think about how the science has made impact in the world. Look at the experiment in the Kent planning- page 5 about the moving tub (links to year 2 term 4). Children to use the post it notes when identifying the variables then teacher to model the experiment- children to identify the variables and how to make it a fair test, describing the surfaces the tub is moving on. Children to list the variables and then see how these form the question they will be testing. Complete the table as a class- differentiate with Communicate in print pictures for some of the tables. The teacher could input the data into a graph on purple mash for the children to discuss. Future learning links after topic: Year 5 unit: • 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 • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.
2.	Deeper learning question: Are all metals magnetic? Reconnection: What is a push and a pull, where do we see this in our daily lives? (They should start to link these words now to magnetism) LO: Let's learn to group metals based on whether they are attracted to a magnet. Enquiry skill: Recording results, identifying important information Activity: Discuss with children where they have seen magnets (e.g. screw drivers, fridge magnets and can openers). Ask them to think about which materials are attracted to magnets. Can they think of a new place to use a magnet – e.g. a magnetic fastener on shoes? Explain that a mixture has accidently been created; steel nails, copper coins, and plastic paperclips have become mixed in with the sand. One scientist thinks that everything but the sand will be attracted to the magnet. Another scientist thinks that only the objects made from metal will be attracted to the magnet. What do the children think? Children can set up and perform this investigation. Then extend this investigation by asking children to sort many different materials; attracted to magnets, not attracted to magnets. Include objects made from metal that won't be attracted to the magnets; e.g. aluminium cans. Show children the results from the teacher's investigation on the white board. Then, ask the children to identify any important information they can find- children to record this in their science books. Then the teacher can model how to write a good conclusion for the results. This can be a model they refer to throughout the term.
3	Deeper learning question: How do magnetic forces work? Reconnection: What materials are magnetic?(should be able to name the metals) What does attracted mean in science? Reinforce the language you will be expecting them to use in lessons. LO: Let's explore how magnetic forces act at a distance and find out if all magnets are the same strength. Enquiry skill: observing and conclusions Activity: Comparative test - Which magnet is the strongest? Help the children to develop a range of tests for finding out which magnet is the strongest. These could include:

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	The kite. Cut out a small piece of card into a kite shape. Attach a paperclip to one end. Using sellotape, attach a length of thread to the other end of the paper (kite). Use the tape to attach the other end of the string to the table. Lift the kite into the air by using a magnet to attract the paperclip. The children could find out the how far away from the paperclip the magnet can be without the kite falling to the table. **Paperclip chain.** Attach a metal paperclip to the end of a magnet. How many more paperclips can be attached to form chain? **Attract through paper.** Place a magnet below a sheet of paper and a paperclip on top. How many sheets of paper can each of the magnets attract through? Children to record observations and draw conclusions.
4	**Deeper learning question**: Do all magnets have a magnetic force? Does anything else have a magnetic force? **Reconnection:** Why do we need to observe and draw conclusions as scientists? **LO:** Let's learn that some forces need contact between two objects, but magnetic forces can act at a distance. **Enquiry skill:** observations conclusions **Activity:** Children to understand how magnets are used in the world around them. Link to compasses. Begin by asking children to rub a magnet on a metal paperclip. Then ask them to place the paperclip near other ones. They should find that for a few moments they have created their own magnet. Now ask them to push this magnetised paperclip into a cork. Place the cork in a bowl of water. Try it several times. Can the children explain what is happening? Discuss with them the fact that the Earth has its own magnetic field. The paperclip is lining up with magnetic North. The children can write the compass direction on small post-its and place them around their bowls.
5	**Deeper learning question:** Do magnets all attract each other? **Reconnection:** Link back to last lesson asking them about the earth's magnetic field. Identify new vocabulary and meanings- reinforce how they will use it in today's lesson. **LO:** Let's learn that magnets have two poles and how they attract or repel. **Enquiry skill:** observing, concluding, predicting **Activity:** **(**this lesson and next lesson are spread over two weeks so that the children have time to reflect and consolidate their understanding of the poles, and apply the new vocabulary, there will be a problem solving element then they can apply it in the second lesson's activity) Problem solving, notice that some forces need contact between two objects, but magnetic forces can act at a distance: Children can tie a piece of thread around the middle of a bar magnet and hold it up be this thread. Discuss with them the fact that all magnets have two poles; a north and a south (probably shown in two colours on your bar magnets). Ask them to predict what they think will happen when you bring similar poles together. Now, what will happen when the poles are different? Recording The children can draw what happens when the poles are placed close to each other.
6	**Deeper learning question:** How are magnets important in our daily lives?

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	Reconnection: Link back to understanding of the poles, and the earth's magnetic field. LO: Let's learn that magnets have two poles and how they attract or repel. Activity: Make a game – The magnetic lions! Begin by each pair of children drawing a line down the middle of a sheet of paper. Along the length of the paper at both sides of the line they must place pairs of magnets (lions). Using another magnet (the explorer), they must push it along the line without attracting the 'lions'. The children can find out how near they can place their lions without them being attracted to the explorer. The children could then invent their own course; maybe a twisting line. This could then link back to the Olympic Vision Pad and they could create a basket ball court or football pitch where the children have to put a blind fold on (groups of 3) and follow the ball whilst another provides a commentary about it.
7	Quiz/assessment

End points:

To describe pushes and pulls as a type of force. To explain how different objects move using forces. To identify how objects move on different surfaces. To be able to explain that there are forces that require contact and some that do not. To be bale to describe magnetic forces as a non-contact and that it acts at a distance. To identify a range of magnetic and non-magnetic materials. To be able to describe magnets as having two pole- north and south. To be able to explain how opposite poles attract and the same poles repel. To be able to describe how not all magnets have the same strength.

To be able to predict and observe how magnets behave. To be able to use results from experiments to help them draw conclusions and identify important information in the results. To use simple scientific vocabulary when describing their understanding and giving examples. To relate their understanding of magnets to the life around them and everyday objects.