

St John's Catholic Primary School

Progression in science

Overall Curriculum Intent

At St John's we provide our children with a rich and stimulating curriculum that encourages creativity, promotes independence and engages our pupils in the wider world around them. As a Catholic school we reflect the example of Jesus through the Gospel Values which underpin all aspects of school life and are shared with all through our mission statement.

St John's is a Forest School and we are very proud to be one of the few primary schools that have achieved the Gold mark awarded by the Council for Learning outside the Curriculum. This award acknowledges our commitment to delivering quality learning experiences that offer challenge and excitement using the outdoors environment as much as possible. We believe strongly in giving children the opportunity to develop core life skills such as resilience, independence, cooperation.

We plan using topics to encourage pupils and develop inquisitive minds and enthusiastic learners. We are committed to developing the whole of the child and acknowledge that children learn in different ways and shine in different areas. As a result, our curriculum is full of opportunities for pupils to excel across all subjects through well-planned, meaningful, class based and outdoor learning experiences that promote a deeper understanding of the curriculum.

In addition to the extensive curriculum offered, our children also enjoy a wealth of lessons delivered by subject specialists and over time, we have nurtured strong relationships within our local area so that all of our children are aware of their responsibilities as a member of the community and that a strong sense of citizenship is developed.

Science Aim

The national curriculum for science aims to ensure that all pupils:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Science Intent

Through the teaching of science at St John's Catholic Primary School, we aim to stimulate and excite children's curiosity about phenomena and events in the world around them, helping them to make sense of these.

Through direct teaching and exploration, we aim to enable the children to learn to question and discuss science-based issues that may affect their own lives, the direction of society and the future of the world.

SKILLS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Exploring/ Observing	Begin to use simple scientific language to talk about or record what they have noticed. Use observations to make suggestions and/or ask questions. Look / observe closely and communicate changes over time. Look / observe closely and communicate the features or properties of things in the real world. Observe closely using their senses.	Use simple scientific language to talk about / record what they have noticed. Use observations to make suggestions and / or ask questions. Observe and describe simple processes / cycles / changes with several steps Observe closely and communicate with increasing accuracy the features or properties of things in the real world.	Observe and record relationships between structure and function Observe and record changes /stages over time Explore / observe things in the local environment / real contexts and record observations	Suggest their own ideas on a concept and compare these with what they observe / find out. Use observations to suggest what to do next. Discuss ideas and develop descriptions from their observations using relevant scientific language and vocabulary Observe and record relationships between structure and function or between different parts of a processes Observe and record changes	Use their developing scientific knowledge and understanding and relevant scientific language and terminology to discuss, communicate and explain their observations Evaluate their observations and suggest a further test, offer another question or make a prediction. Observe (including changes over time) and suggest a reason for what they notice.	Use correct scientific knowledge and understanding and relevant scientific language to discuss their observations and explorations Identify changes that have occurred over a very long period of time (evolution) and discuss how changes have impacted the world.

Grouping and Classifying	Name / identify common examples and some common features. With help, decide how to sort and group objects, materials or living things. Name basic features of objects, materials and living things. Say how things are similar or different. Compare and contrast simple observable features / characteristics of objects, materials and living things.	Name / identify common examples, some common features or different uses. Sort and group objects, materials or living things by observable and/or behavioural features. Compare and contrast... a variety of things [objects, materials or living things] - focusing on the similarities as well as the differences.	Decide ways and give reasons for sorting, grouping, classifying, identifying things / objects, living things, processes or events based on specific characteristics. Compare and contrast and begin to consider the relationships between different things Record similarities as well as differences	Ask / raise their own relevant questions with increasing confidence and independence that can be explored, observed, tested or investigated further. Ask questions such as 'What will happen if...?' or 'What if we changed...?' Choose / select a relevant question that can be answered [by research or experiment / test].	Suggest reasons for similarities and differences. Compare and contrast things beyond their locality and use these similarities and differences to help to classify Use secondary sources of information to identify and classify. Decide which sources of information (and / or equipment and / or test) to help identify and classify.	Recognise the importance of classification to the scientific world and form a conclusion from their sorting and classifying. Compare and contrast more complex processes, systems, functions (e.g. sexual and asexual reproduction). Construct a classification key / branching database using more than two items. Compare and contrast things beyond their locality and discuss advantages / disadvantages, pros / cons of the similarities and differences. Use <i>research*</i> to identify and classify things. Use classification systems, keys and other information records [databases] to help classify or identify things.
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Questioning	Ask simple questions about what they notice about the world around them. Demonstrate curiosity by the questions they ask.	Raise their own logical questions based on or linked to things they have observed. With help / scaffolds, begin to ask questions such as 'What will happen if...?'"	Explore their own ideas about 'what if....?' scenarios Ask questions such as 'What if we tried....?' or 'What if we changed...?' Begin to understand that some questions can be tested in the classroom and some cannot. Within a group, suggest questions that can be explored, observed, tested or investigated further Within a group, suggest relevant questions about what they observe and about the world around them.	Ask / raise their own relevant questions with increasing confidence and independence that can be explored, observed, tested or investigated further. Ask questions such as 'What will happen if...?' or 'What if we changed...?' Choose / select a relevant question that can be answered [by research or experiment / test].	Recognise scientific questions that do not yet have definitive answers Refine a scientific question so that it can be tested e.g. 'What would happen to... if we changed...?' Decide whether their questions can be answered by researching or by testing. Independently ask their own scientific questions taking some ownership for finding out the answers.	Recognise scientific questions that do not yet have definitive answers Refine a scientific question to make it testable Use observations to suggest a further (testable or research) question. Independently ask a variety of scientific questions and decide the type of enquiry needed to
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Research	Ask people questions Use simple primary and secondary sources (such as objects, books and photographs) to find things out.	Talk about how useful the information source was and express opinion about findings. Make suggestions about who to ask or where to look for information. Ask people questions to help them answer their own questions. Use simple and appropriate secondary sources (such as books, photographs, videos and other technology) to find things out /	Find things out using a range of secondary sources of information	Make decisions about which information to use from a wide range of sources and make decisions about how to present their research. Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations.	Find out how scientific ideas have changed / developed over time Articulate and explain findings from their research using scientific knowledge and understanding. Make decisions about which information to use from a wide range of sources.	Research how scientific ideas have developed over time and had an impact on our lives. Use evidence from a variety of sources to justify their ideas Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. Interview people to find out information
Modelling	With help, follow movements (dance / drama) to act out their science.	Act out something to represent something else about the world around us	Act out or make a model of something to represent something in the real world using appropriate scientific vocabulary verbally.	Make a visual representation or a model of something to represent something they have seen or a process that is difficult to see. Suggest their own ideas on a concept and compare these with models or images.	Perform / create simple models to exemplify scientific ideas using scientific terminology where appropriate	Make / perform and use their own versions of simple models to describe and explain scientific ideas

Collaborating	Share ideas in a group and listen to the ideas of others.	Share ideas in a group and listen to the ideas of others.	Begin to make some decisions about an idea within a group from a list of choices	Make some decisions about an idea within a group	Propose their own ideas and make decisions with agreement in a group.	Propose their own ideas and make decisions with agreement in a group.
	Work with others on a science task.	Work cooperatively with others on a science task making some choices.	With help; support, listen to and acknowledge others in the group Build on / add to someone else's idea. Begin to understand that it is okay to disagree with their peers and offer a reason for their opinion.	Increasingly support, listen to and acknowledge others in the group. Build on / add to someone else's idea to improve a plan. Understand that it is okay to disagree with their peers and offer reasons for their opinion.	Support, listen to and acknowledge others in the group Check the clarity of each other's suggestions Build on / add to someone else's idea to improve a plan or suggestion. Understand that it is okay to disagree with their peers and offer a reasons for their opinion.	Support, listen to and acknowledge others in the group. Check the clarity of each other's suggestions. Build on / add to someone else's idea to improve a plan or suggestion. Understand that it is okay to disagree with their peers and offer reasons for their opinion.

Planning and testing	With help, carry out a simple test / comparative test. With help, make a simple prediction or suggestion about what might happen. Begin to suggest some ideas e.g. choose which equipment to use, choose which materials to test from a selection. Talk about ways of setting up a test.	Carry out simple comparative tests as part of a group, following a method with some independence. Make a simple prediction about what might happen and try to give a vague reason (even though it might not be correct). With support, make suggestions on a method for setting up a simple comparative test. Talk about a practical way to find answers to their questions.	Help to decide about how to set up a simple fair test and begin to recognise when a test is not fair. Make a prediction based on everyday experience. With support / as a group, set up simple practical enquiries including comparative and fair tests e.g. make a choice from a list of a things (variables) to change when conducting a fair test. As a group, begin to make some decisions about the best way of answering their questions. Find / suggest a practical way to compare things e.	Carry out simple fair tests with increasing confidence investigating the effect of something on something else Start to make their own decisions about the most appropriate type of science enquiry they might use to answer scientific Make a prediction based on the knowledge acquired from previous explorations / observations and apply it to a new situation. Explain their planning decisions and choices. Make some of the planning decisions about what to change and measure / observe. Begin to recognise when a fair test is necessary	Carry our fair tests and other investigations with increasing independence. Suggest more than one possible prediction and begin to suggest which is the most likely. Justify their reason with some knowledge and understanding of the scientific concept. Make decisions about which variables to change, measure and keep the same Make most of the planning decisions for an investigation. Recognise when it is appropriate to carry out a fair test.	Predict what a graph might look like before collecting results. Make a hypothesis where they say how one thing will affect another and give a reason for their suggestion with a developing understanding of the scientific concept. Identify variables to change, measure and keep the same in order for a test to be fair. Independently plan investigations and explain planning decisions. Decide when it is appropriate to carry out a fair test investigation, comparative
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Using Equipment and Measures	Measure using non-standard units e.g. how many lolly sticks / cubes / handfuls, etc. Observe closely, using simple equipment (e.g. hand lenses, egg timers). Use senses to compare different textures,	Measure using non-standard units e.g. how many lolly sticks / cubes / handfuls, etc. Observe closely, using simple equipment (e.g. hand lenses, egg timers). Use senses to compare different textures, sounds	Collect data from their own observations and measurements using notes / simple tables / standard units. Help to make some decisions about what observations to make, how long to make them for, the type of simple equipment that might be used and how to work safely. Make simple accurate measurements using whole number standard units, using a range of equipment. Gather data in a variety of ways to help in answering questions. Use equipment accurately to improve the detail of their measurements / observations	Begin to identify where patterns might be found and use this to begin to identify what data to collect. Make more of the decisions about what observations to make, how long to make them for and the type of equipment that might be used. Recognise obvious risks and how to keep themselves and others safe. Learn how to use new equipment, such as data loggers and measure temperature in degrees Celsius (°C) using a thermometer. Collect data from their own observations and measurements, using notes / simple tables / standard units. Make accurate measurements using standard units [and more complex units and parts of units] using a range of equipment and scales.	Make their own decisions about what observations to make or measurements to use and how long to take them for (recognising the need for repeat readings on some occasions). Take measurements using a range of scientific equipment with increasing accuracy and using more complex scales / units. Identify possible risks to themselves and others and suggest ways of reducing these. Choose the most appropriate equipment and make accurate measurements.	Decide whether to repeat any readings and justify the reason for doing so. Make their own decisions about what measurements to take (and begin to identify the ranges used). Make, and act on, suggestions to control / reduce risks to themselves and others. Use equipment fit for purpose to take measurements which are increasingly accurate and precise. Decide the most appropriate equipment to use to collect data.
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Communicating	Communicate their ideas to a range of audiences in a variety of ways. Complete a pre-constructed table / chart using picture records or simple words. Contribute to a class display. Add annotations to drawings or photographs. Begin to use some simple scientific language Record simple visual representations of observations made.	Record and communicate their findings in a range of ways to a variety of audiences. Use simple scientific language with increasing accuracy Record simple data with some accuracy to help in answering questions	Record and present findings using simple scientific language and vocabulary <i>including discussions, oral and written explanations, notes, annotated drawings, pictorial representations, labelled diagrams, simple tables, bar charts (using scales chosen for them), displays or presentations.</i> With scaffold / support record, and present data in a variety of ways to help in answering questions. Communicate their findings in ways that are appropriate for different audiences.	Record findings using relevant scientific language and vocabulary, including discussions, oral and written explanations, notes, drawings (annotated), pictorial representations, labelled diagrams, tables and bar charts [where intervals and ranges agreed through discussion], displays or presentations. Begin to select the most useful ways to collect, record, classify and present data from a range of choices. Make decisions on how best to communicate their findings in ways that are appropriate for different audiences.	Use their developing scientific knowledge and understanding and relevant scientific language and terminology to communicate more abstract concepts Present and explain their findings through talk, in written forms or in other ways (e.g. using technology) for a range of audiences / purposes. Record data and results of increasing complexity using different formats e.g. tables, annotated scientific diagrams, classification keys, graphs and models. Make decisions about the most appropriate way of recording data.	Articulate understanding of the concept using scientific language and terminology when describing abstract ideas, observations and findings. Record data and results of increasing complexity using scientific diagrams and labels, recognised symbols, classification keys, tables, bar and line graphs, and models. Make decisions about how to present and explain their findings through talk, in written forms or in other ways
Describing results and looking for patterns	Use recordings to talk about and describe what happened. Sequence photographs of an event / observation.	With guidance, begin to notice patterns in their data Recognise if results matched predictions. Use their recordings to talk about and describe what has happened.	With scaffold / support, describe and compare the effect of different factors on something With help, look for changes and simple patterns in their observations, data, chart or graph. Use their results to consider whether they met their predictions.	Notice / find patterns in their observations and data With some independence, analyse results / observations by writing a sentence that matches the evidence i.e. deciding the important aspect of the result and summarising in a conclusion.	Describe straightforward patterns in results linking cause and effect Look for / notice relationships between things and begin to describe these. Comment on the results and whether they support the initial prediction.	Spot unexpected results that do not fit the pattern (anomalies). Identify patterns in results collected and describe them using the change and measure variables

Explaining results	Begin to use simple scientific language to talk about what they have found out or why something happened.	Begin to use simple scientific language to explain what they have found out. Give a simple, logical reason why something happened	Use their experience and some evidence or results to draw a simple conclusion to answer their original question. Write a simple explanation of why things happened (using the word 'because') and using simple scientific language and vocabulary	Begin to develop their ideas about relationships and interactions between things and explain them. Use relevant scientific language and vocabulary to begin to say / explain why something happened.	Use their scientific knowledge and understanding and appropriate scientific language and terminology to explain their findings and data and answer their initial question. Draw a valid conclusion (explain why it happened) based on their data and observations	Identify evidence that refutes or supports their ideas. Independently form a conclusion which draws on the evidence from the test Use scientific language and terminology to explain why something happened.
Trusting results	N/A	Begin to discuss if the test was unfair .	Say whether what happened was what they expected and notice any results that seem odd. Begin to recognise when a test is not fair and suggest improvements.	Use results to suggest improvements, new questions and / or predictions for setting up further tests. Compare their results with others and give reasons why results might be different.	Begin to recognise how repeated readings improve the reliability of results. Compare results with others and comment on how reliable they are.	Be able to suggest reasons for unexpected results (anomalies). Describe how to improve planning to produce more reliable results. Say how confident they are that their results are reliable and give a reason.

KNOWLEDGE	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Plants	Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. Identify and describe the basic structure of a variety of common flowering plants, including trees (at least: flower, leaf, root, stem, trunk, seed, branch and petal).	Observe and describe how seeds and bulbs grow into mature plants. Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy (and how changing these affects the plant). Plants are living and eventually die	Identify, locate and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. Investigate the way in which water is transported within plants. Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.		Name, locate and describe the functions of the main parts of reproductive system of plants	

Animals: humans	Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. Recognise that humans are animals. Compare and describe differences in their own features (eye, hair, skin colour, etc.). Recognise that humans have many similarities.	Notice that humans have offspring which grow into adults. Find out about and describe the basic needs of humans, for survival (water, food and air). Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. An adequate and varied diet is beneficial to health (along with a good supply of air and clean water). Regular and varied exercise <i>from a variety of different activities</i> is beneficial to health	Describe the simple functions of the basic parts of the digestive system in humans. Identify the different types of teeth in humans and their simple functions.	Describe the changes as humans develop to old age.	Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function (in the long term and short term). Describe the ways in which nutrients and water are transported within animals, including humans.
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Animals: other animals	Identify and name a variety of common animals including some fish, some amphibians, some reptiles, some birds and some mammals. Identify and name a variety of common animals that are carnivores, herbivores and omnivores (i.e. according to what they eat). Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, and including pets).	Notice that animals have offspring which grow into adults. Find out about and describe the basic needs of animals for survival (water, food and air).	Identify that humans and some other animals have skeletons and muscles for support, protection and movement. Identify animals (vertebrates) which have a skeleton which supports their body, aids movement & protects vital organs (e.g. name and locate skull, backbone, ribs, bones for movement/limbs, pelvis and be able to name some of the vital organs protected). Identify animals without internal skeletons/backbones (invertebrates) and describe how they have adapted other ways to support themselves, move & protect their vital organs. Recognise that animals are alive; they move, feed, grow, use their senses and reproduce.	Construct and interpret a variety of food chains, identifying producers, predators and prey	Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. Describe the life process of reproduction in some plants and animals	
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Living things and their habitats		Explore and compare the differences between things that are living, dead, and things that have never been alive. Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. Identify and name a variety of plants and animals in their habitats, including micro-habitats. Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. Observe living things in their habitats during different seasonal changes.		Recognise that living things can be grouped in a variety of ways. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Recognise that environments can change and that this can sometimes pose dangers to living things. Use and make identification keys for plants and animals.		Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences including micro-organisms, plants and animals. Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
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Material properties	Distinguish between an object and the material from which it is made. Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, rock, brick, paper and cardboard. 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 simple physical properties.	Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, water, 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 (applying a force). Some materials can be found naturally; others have to be made	Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. Describe in simple terms how fossils are formed when things that have lived are trapped within rock. Recognise that soils are made from rocks and organic matter	Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic (advantages and	
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Material changes					Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. □ Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. Demonstrate that dissolving, mixing and changes of state are reversible changes. Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible.	
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Light and astronomy	Observe and describe changes across the four seasons. Observe and describe weather associated with the seasons and how day length and temperature varies.		Recognise that they need light in order to see things and that dark is the absence of light. Notice that light is reflected from surfaces. Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. Recognise that shadows are formed when the light from a light source is blocked by a solid object. Find patterns in the way that the size of shadows can change.		Describe the movement of the Earth, and other planets, relative to the Sun and each other in the solar system. Describe the movement of the Moon relative to the Earth. Describe Sun/Earth/Moon as approximately spherical bodies. Use the idea of the Earth's rotation to explain day and night.	Recognise that light appears to travel in straight lines. Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. Explain that we see things because the light that travels from light sources to our eyes or from light sources to objects and then to our eyes (and represent this in simple diagrammatic form). Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.
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Sound				Vibrations Identify how sounds are made, associating some of them with something vibrating. Recognise that vibrations from sounds travel through a medium to the ear. Find patterns between the volume of a sound and the strength of the vibrations that produced it. Recognise that sounds get fainter as the distance from the sound source increases. Pitch Find patterns between the pitch of a sound and features of the object that produced it. Muffling/blocking sounds Recognise that vibrations from sounds travel through a medium to the ear.		
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Electricity				Identify common appliances that run on electricity. Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors.		Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. Use recognised symbols (at least: cells, wires, switches, bulbs, buzzers and motors) when representing a simple circuit in a diagram. Use/interpret circuit diagrams to construct a variety of more complex circuits predicting whether they will 'work'.
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Forces and magnets			Compare how some things move on different surfaces. Notice that some forces need contact between two objects but magnetic forces can act at a distance. Observe how magnets attract or repel each other and attract some materials and not others. Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. Describe magnets as having two poles (like and unlike poles). 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 (causing things to slow down) Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	
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