Year Group: Year 5	Term: Spring 2	Topic: Animals including humans

National Curriculum Links

Pupils in Key Stage Two should be taught to:

- describe the changes as humans develop to old age

Working scientifically

- plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- use test results to make predictions to set up further comparative and fair tests
- report and present findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
- identify scientific evidence that has been used to support or refute ideas or arguments

Prior Learning	Future Learning
• Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)	• Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. (KS3)

Common Misconceptions

Some children may think:

- **a baby grows in a mother's tummy**
- **a baby is "made".**

Sustainable Development Goals

This global goal would be perfect to fit with this unit of learning.

Add activities here

Catholic Social Teaching

Add activities here

Knowledge and Skills Objectives	Activity	Differentiation
Lesson 1 I can describe the stages of human development. *Add w/s here*	Add pre-assessment task What is the human life cycle? (TTYP and generate a discussion to receive an **insight of children's prior knowledge about** this.) **Introduce the term 'reproduction'. Has anyone heard of this word before?** What does it mean? Explain that there are different types of reproduction and ask if children know any of them. Can they think about how plants and animals reproduce? Discuss the types of reproduction and what they mean. (1) In small mixed ability groups, children can try to sort a variety of images of living things into the correct reproduction category – sexual reproduction, asexual reproduction & both. (Take photos and create a pic collage for books). Go through answers and allow children to make changes to their sorting diagram. Prior knowledge activity – briefly map children's current understanding about the stages of the human lifecycle (to be added to later). Children will learn about, and then order the main stages in the life cycle of humans. (Can any additional stages be added to your class timeline?). They will be able to describe the changes as humans develop to old age by creating a timeline to indicate the stages in the growth and development of humans.	(2) Main Book Activity SEN – Children match names and stages of human growth and development and order them on a timeline. (Challenge – can they recall the ages each stage happens and add these on?) LA – Children to match names, stages and ages each one occurs in the correct order on a timeline. MA – Children are given pictures and ages to match and then add the names of the stages. Children to write one short fact about each stage. HA – Children to write an explanation for each of the stages of human growth and development. Challenge – How **might a human's** emotional development grow?
Knowledge and Skills Objectives	Activity	Differentiation

Lesson 2 I can explain how babies grow and develop. Add w/s here	Hook – Show children a baby doll. At which stage of the human life cycle is this human? Which stage will it move onto next? How can we ensure it reaches that stage? How can we look after a baby to support its growth and development? Describe the changes as humans develop to old age in the context of the development of babies in their first year. They can explain how babies grow and develop. Record data and results using bar and line graphs in the context of the growth of babies in height and/or weight during their first year after birth and present data. Where is data coming from?	LA – Adult to work with children using Growth in Height of Babies Datasheet. Depending on confidence and ability children can be asked to work independently or in pairs. MA – Children work in pairs using Growth in Height of Boys and Girls Datasheet. HA – Children work independently using Growth in Height and Weight of Boys and Girls Datasheet.
Knowledge and Skills Objectives	Activity	Differentiation
Lesson 3 I can describe the main changes that occur during puberty. Add w/s here	Ask children to flick back to their timeline. At which stage does puberty **occur? What does this mean? Has anyone heard of the word 'puberty'** before? Explain what puberty means and that the body goes through a series of changes. Before looking at the changes in boys and girls, engage children in a fact or fiction about different ideas of puberty. Introduce children to the main changes that occur during puberty. Discuss the reasons why changes occur during puberty and identify the similarities and differences between how boys and girls experience puberty. Describe the changes as humans develop to old age by comparing the changes that take place to boys and girls during puberty. What w/s can be done in this lesson?	SEN&LA – Children label the physical changes that occur during puberty. MA – Children label the physical changes and give reasons why puberty occurs. HA – Children label the physical changes that occur during puberty and answer questions on similarities and differences. Challenge – Can children identify how puberty occurs in different animals e.g. lions, butterflies, dogs, cats etc. (Match in book once checked).
Knowledge and Skills Objectives	Activity	Differentiation
Lesson 4 I can identify the changes that take place in old age. Add w/s here	What happens to our appearance and ability as we get older? Why do you think that is? **(1)** Children to arrange a series of statements into true or false categories. (Take photos to create a pic collage for books). Discuss the fact from the fiction and allow children to provide reasons for why they	**(2) Main Book Activity** SEN – Using the Old Age True or False Cards children to sort them and stick them into the correct place on the table in their books (True/False). **(Challenge – can they give a reason for one of the statements as to why it is either true or false).**

	have sorted each statement that way. Explain whether each statement is true/false and why this might be. Allow children to edit their tables. Children will learn about some changes in the body that occurs during the transition from adulthood to old age. They can describe ways in which they may change as they get older, and discuss some problems associated with stereotypical views regarding the elderly. They will be able to describe the changes as humans develop to old age by understanding the changes that take place in old age. Children to use their sorting tables to help them with their book activity.	LA – Given an image of an elderly person. To label the image with changes that happens during this stage of the human life cycle. MA & HA – To create a poster which explains the changes during Late Adulthood/ Old Age. Challenge – Stick a series of questions about Old Age into their book. Can they answer them confidently?
Knowledge and Skills Objectives	**Activity**	**Differentiation**
Lesson 5 I can report findings from enquiries (in the context of the gestation period for animals). *Add w/s*	The children will be investigating the reasons for different gestation periods over the course of the next two lessons. This lesson will focus on gestation and types of animals They will report findings in oral form as well as written explanations and choose how best to report their findings. Add information about the investigation and a WAGOLL for the written explanations	LA – Children compare the gestation periods of different types of vertebrates. AA – Children predict and compare the gestation periods of different types of vertebrates. HA – Children predict and compare the gestation periods of vertebrates and invertebrates.
Knowledge and Skills Objectives	**Activity**	**Differentiation**
Lesson 6 I can record complex data using graphs and models (in the context of comparing gestation periods and life expectancies of animals) *Add w/s*	Show the gestation periods table. Children feedback about any patterns they have spotted in the gestation periods of different animals. **'Animals with longer life expectancies have longer gestation periods'.** Children discuss what information they would need to answer this question and how they would record their data. What is life expectancy? Children discuss with talk partner and feed back to the whole class to create a definition. Will this lesson take 2 hours?	AA – Groups given the differentiated Life Expectancy of Animals Table as well as/ or instead of using the Internet. HA – Groups given the differentiated Life Expectancy of Animals Table to check accuracy of information they have found.

Applied Write Opportunities

- write instructions or a recipe for being a baby on the How to Be a Baby Activity Sheet.
- produce a leaflet about how to stay healthy and active during old age and write a short paragraph explaining what they have found.

Enrichment Opportunities

Assessment Opportunities

- Can explain the changes that takes place in boys and girls during puberty
- Can explain how a baby changes physically as it grows, and also what it is able to do

Key Vocabulary

Tier 2: old age, human egg, sperm, foetus, baby, toddler, child, teenager, adult, old age, development, growth, human, infancy, childhood.

Tier 3: development, growth rate, adulthood, adolescence, prenatal

SS John Fisher & Thomas More Catholic Primary School

A Voluntary Academy

Year Group: Year 5	Term: Spring 1	Topic: Earth and Space

National Curriculum Links

Pupils in Key Stage Two should be taught to:

- describe the movement of the Earth and other planets relative to the sun in the solar system
- describe the movement of the moon relative to the Earth
- describe the sun, Earth and moon as approximately spherical bodies
- **use the idea of the Earth's rotation** to explain day and night and the apparent movement of the sun across the sky

Working scientifically

- plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- use test results to make predictions to set up further comparative and fair tests
- report and present findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
- identify scientific evidence that has been used to support or refute ideas or arguments

Prior Learning	Future Learning
• Explore the natural world around them. (Reception – Earth and space) • Describe what they see, hear and feel whilst outside. (Reception – Earth and space) • Observe changes across the four seasons. (Y1 - Seasonal changes) • Observe and describe weather associated with the seasons and how day length varies. (Y1 - Seasonal changes)	• Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only). (KS3) • Our Sun as a star, other stars in our galaxy, other galaxies. (KS3) • **The seasons and the Earth's tilt, day length at different times of year,** in different hemispheres. (KS3) • The light year as a unit of astronomical distance. (KS3)

Common Misconceptions

Some children may think:

- the Earth is flat
- the Sun is a planet
- the Sun rotates around the Earth
- the Sun moves across the sky during the day
- the Sun rises in the morning and sets in the evening
- the Moon appears only at night
- night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth.

Sustainable Development Goals and Catholic Social Teaching

Sustainable Development Global Goals would be perfect to fit with this unit of learning:

These Catholic Social Teaching strands would be perfect to fit with this unit of learning

Applied Write Opportunities	Enrichment Opportunities
• Diary written in first person as Jamie Drake from The Jamie Drake Equation.	

Assessment Opportunities

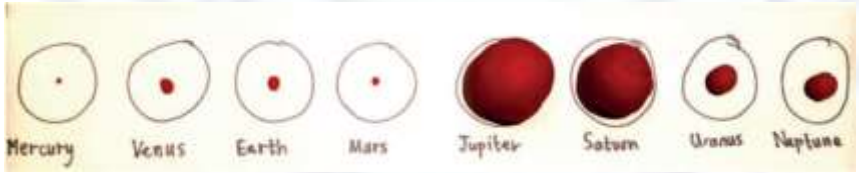
- Can use the model to explain how the Earth moves in relation to the Sun and the Moon moves in relation to the Earth
- Can demonstrate and explain verbally how day and night occur
- Can explain evidence gathered about the position of shadows in term of the movement of the Earth and show this using a model
- Can explain how a sundial works
- Can explain verbally, using a model, why we have time zones
- Can describe the arguments and evidence used by scientists in the past

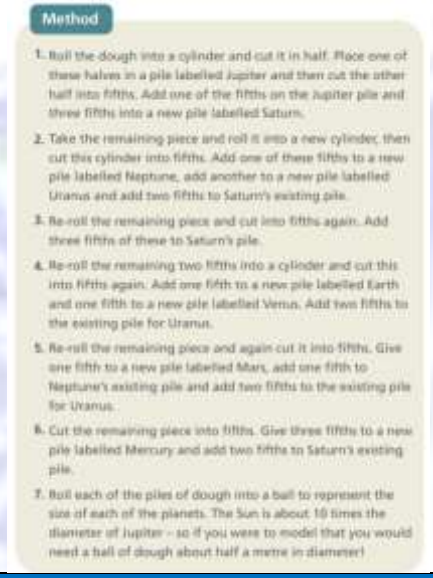
Key Vocabulary

Tier Two:
Sun, Earth, Moon, star, planet, sphere, orbit, rotate, axis.

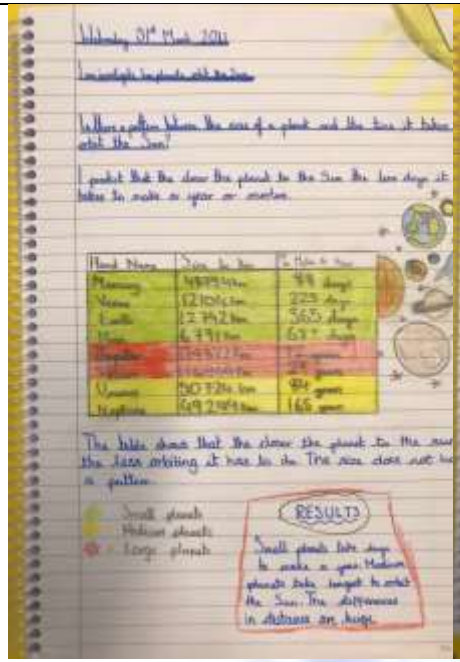
Tier Three:
spherical bodies, satellite, phase, geocentric model, heliocentric model.

Knowledge and Skills Objectives	Activity	Differentiation
Lesson One I can explain how we know the Earth, Sun and Moon are spheres. ADD W/S HERE	Prior knowledge activity – In small groups or pairs, children should sort a series of statements into the categories: true, false or not sure. Discuss their ideas and reasons after and clarify any misconceptions that may arise here. Discussion: TTYP - Is the Earth flat? Ask the children to provide a reason/evidence for their answer. Take a whole class vote – Yes/No. Use the **'Agree,** Build On and **Challenge'** technique to gather ideas. Look at images of Earth taken from space. Explain that these photos are more recent and ask what people thought the shape of the Earth was before we had photos? TTYP – Why do you think some people thought the Earth was flat? Exploration: Show a **'flat'** and **'round'** Earth model. On each, place two model people near one edge of the **'land',** then start to move one away. Ask what the person left behind will see as the other retreats (TTYP). Establish that on the flat Earth the person just gets smaller and smaller whereas on the round Earth the figure disappears feet first. Reinforce this by showing images of ships sailing away. Are the Moon and Sun spheres?(TTYP) Explain that during lunar eclipses, the **Earth's** shadow on the Moon always appears circular and the only shape that casts a round shadow is a sphere.	LA – Draw three pictures to show what an observer on land would see as a ship sails away 1. If the Earth is flat. 2. If the Earth is round. X6 pictures in total. MA – Same as LA with a written explanation about how we know the Earth is a sphere. HA – A written explanation about how we know the Earth is a sphere. To also research the size of the Sun, Earth and Moon and to write them in order according to their size. Challenge – How do we know that the Moon is a sphere?

Knowledge and Skills Objectives	Activity	Differentiation
Lesson Two I can identify and order planets in our solar system. ADD W/S HERE	How did the Earth begin? (TTYP) Scientists now have evidence that the solar system was formed 4.6 billion years ago when a massive spinning cloud of dust and gas collapsed inwards due to the force of gravity. As most of the material concentrated in the centre, it became so hot and dense that it formed a new star (our infant Sun), surrounded by a disk of spread out dust and gas. Small clumps of matter began to form in the disk; as these got bigger, their force of gravity attracted other clumps and they continued to grow, forming planets and moons. Explain that the solar system consists of eight planets and their moons, orbiting a star, our Sun. There are also a number of dwarf planets, asteroids and comets. Can you name any? (TTYP) https://www.youtube.com/watch?v=mQrIgH97v94 Can they put the planets in order without support? Hand out the little cut out cards of the planets with their names. Allow children to work in pairs to put them in order. Check order and then share the rhyme to help them remember the order. • My Very Excellent Mother Just Served Us Noodles • My Very Easy Method Just Speeds Up Names Introduce our main activity – comparing the sizes of the planets practically. 1. Children will be given a strip of 8 circles in equal size. They must label each one the name of a planet (in the correct order). Check these before we proceed.  	All children to engage in creating the planets using playdough. How will you challenge the HA?

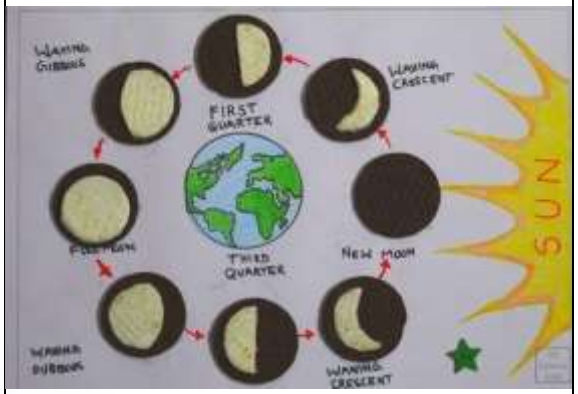
	2. Children to be given some plasticine/dough (can be done in pairs) and teacher to read the following instructions so children can create their playdough planets:  Method 1. Roll the dough into a cylinder and cut it in half. Place one of these halves in a pile labelled Jupiter and then cut the other half into fifths. Add one of the fifths on the Jupiter pile and three fifths into a new pile labelled Saturn. 2. Take the remaining piece and roll it into a new cylinder, then cut this cylinder into fifths. Add one of these fifths to a new pile labelled Neptune, add another to a new pile labelled Uranus and add two fifths to Saturn's existing pile. 3. Re-roll the remaining piece and cut into fifths again. Add three fifths of these to Saturn's pile. 4. Re-roll the remaining two fifths into a cylinder and cut this into fifths again. Add one fifth to a new pile labelled Earth and one fifth to a new pile labelled Venus. Add two fifths to the existing pile for Uranus. 5. Re-roll the remaining piece and again cut it into fifths. Give one fifth to a new pile labelled Mars, add one fifth to Neptune's existing pile and add two fifths to the existing pile for Uranus. 6. Cut the remaining piece into fifths. Give three fifths to a new pile labelled Mercury and add two fifths to Saturn's existing pile. 7. Roll each of the piles of dough into a ball to represent the size of each of the planets. The Sun is about 10 times the diameter of Jupiter – so if you were to model that you would need a ball of dough about half a metre in diameter!	
Knowledge and Skills Objectives	**Activity**	**Differentiation**
<u>Lesson Three</u> I can investigate how planets orbit the Sun. Add w/s here	Recap! Hand out the little planet cards and ask children to order them. Check the order. Main: What facts do children remember about the planets from last lesson? (TTYP) Introduce investigation question - Is there a pattern between the size of a planet and the time it takes to orbit the Sun? Show images of how planets orbit the Sun.	SEN/LA – Sick the correct order of the planets onto A3 paper. Children to highlight/underline the length of a year and the size for each one. Do they notice anything? Write what they notice on the sheet. MA/HA – Can work with the person next to them to explore and generate an answer to the investigation question. Table templates for MA to stick into their books.

	Discuss predictions to this question before children investigate it (TTYP). Will the size of the planet matter? Do you think larger/smaller planets will take longer? Why do they think this? Could something else be an important factor in the length of time planets take to orbit the Sun? Explain that children will be jotting their ideas into a table. Hand out the research cards and let children work with their partner to fill in their tables. Can they spot a pattern? Can they devise an answer to their research question? EXAMPLES OF WORK:	Extension: Answer question cards using the information about the planets.

	  Plenary: Show https://www.youtube.com/watch?v=wwYegvdEJHg to clarify findings.	
Knowledge and Skills Objectives	Activity	Differentiation

Lesson Four I can understand that the seasons **are related to the Earth's tilt and** orbit. Add w/s here	Starter: Quick-fire recap questions (from Geog) and children to use their whiteboards to answer. 1. How long does the Earth take to complete one full rotation? (24 hours) 2. How long does the Earth take to orbit the Sun? (365 days) 3. What does the Earth spin on? **(it's** axis) 4. How is day and night created? (from one full rotation) Recap how day and night is created by showing this video: https://www.youtube.com/watch?v=MtRzy2TJAOQ Ask why the length of day is different in summer and winter? (TTYP) In order to consolidate this, place a lamp in the centre of the room to represent the Sun. Using the globe, show the orbit of the Earth around the Sun. Show the children how the Earth is tilted on its axis and how this makes the northern hemisphere closer to the Sun for half of the year and further away from the Sun for the other half of the year. Explain that when the NH is closer to the Sun, the days are longer and when the NH is further away from the Sun, the days are shorter. 1. Children to have a go at this in small groups using torches (Sun) and tennis balls (Earth). They must use the correct vocabulary and explanations as they explore this. Award dojos for teams explaining the process correctly. Explain that this process forms seasons. What are the four seasons? https://www.youtube.com/watch?v=b25g4nZTHvM Repeat the demonstration focusing on how seasons happen.	LA – Draw two images of the UK on Earth – in winter and in summer. MA - draw and label images of the earth (UK) during summer and winter, answer T/F questions. HA – draw and label pictures of the UK in summer and winter, describe how the movement of the Earth creates seasons. Challenge – What would happen if there were no seasons? The weather and day length would be constant all year round.
Knowledge and Skills Objectives	**Activity**	**Differentiation**
Lesson Five I can describe the **Sun's** movements across the sky. Add w/s here	What is a shadow? (TTYP) Do they change? (TTYP) Check that children know shadows change throughout the day and that this change occurs because the Sun appears to move across the sky. Establish that shadows are shortest at midday, when the Sun is the highest in the sky. Ask children to put a piece of blue tack in the middle of an A3 piece of paper and place a pencil upright into it. They should then use this to measure the	All children to work in mixed ability pairs to explore how shadows change throughout the day. Children to transfer this information into a: LA – Bar chart MA/HA – Line graph

	length of the shadow at different times of the day. Take it to the exact same place outside and measure the length of the shadow. Make a record of this on their table. If it is not a sunny day, children can create this similarly in the classroom using a torch to represent the Sun. They must ensure that the torch is at the correct position to show different times throughout the day.	
Lesson Six I can explain the movement of the Moon.	What do you know about the Moon? (TTYP) https://www.youtube.com/watch?v=6AviDjR9mmo What facts did you learn about the Moon? (TTYP) How was it created? What substance used to cover the surface of the Moon? Why does it have little indents on it? Have humans landed on the Moon? Emphasise that the Moon is a satellite which orbits the Earth. Introduce the phases of the Moon and recap with song: https://www.youtube.com/watch?v=79M2ISVZiY4 The Moon has different phases as it orbits the Earth. Explain that at various times in a month, the Moon looks different. This is because as the Moon rotates round the Earth, the Sun lights up different parts of it. Phases of the Moon using Oreos activity.	Working in pairs: Children to draw the Earth in the centre of the paper plate. Use Oreos to create the different phases of the Moon around the Earth and label each phase.  WAGOLLs:

	Extension: Space crossword activity.	

SS John Fisher & Thomas More Catholic Primary School

A Voluntary Academy

Year Group: Year 5	Term: Autumn 2	Topic: Forces

National Curriculum Links

Pupils in Key Stage Two should be taught to:

- 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.

Working scientifically

- plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- use test results to make predictions to set up further comparative and fair tests
- report and present findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
- identify scientific evidence that has been used to support or refute ideas or arguments

Prior Learning	Future Learning
• Compare how things move on different surfaces. (Y3 - Forces and magnets) • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets) • Observe how magnets attract or repel each other and attract some materials and not others. (Y3 - Forces and magnets) • 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. (Y3 - Forces and magnets) • Describe magnets as having two poles. (Y3 - Forces and magnets) • Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 - Forces and magnets)	• 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)

Common 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.

Sustainable Development Goals & Catholic Social Teaching

These Sustainable Development Global Goals would be perfect to fit with this unit of learning:

These Catholic Social Teaching strands would be perfect to fit with this unit of learning:

Applied Write Opportunities	Enrichment Opportunities

Assessment Opportunities

- **Can explain the results of their investigations in terms of the force, showing a good understanding that as the object tries to move through the water or air or across the surface the particles in the water, air or on the surface slow it down**
- **Can demonstrate clearly the effects of using levers, pulleys and gears**

Key Vocabulary
Tier Two: ***forces, weight, gravity, push, pull*** **Tier Three:** **mass, gravitational pull, air/water resistance, buoyancy, streamlined, aerodynamic**

Knowledge and Skills Objectives	Activity	Differentiation
Lesson One I can identify forces and how they affect objects around us. Working Scientifically	Starter: Mind map all that children can recall about forces on flipchart paper using TTYP (last addressed in Year 3). Do any of their ideas link together? Do other children agree with ideas raised? This can be added to throughout the unit as more learning is achieved. Whole class activity (1): Generate a discussion about forces. TTYP what is a force? TTYP can you think of any examples of where forces are acting? Gather feedback. 1. Carefully select two volunteers to each hold the end of a skipping rope. 2. Ask the rest of the class to describe the shape of the rope as the volunteers just hold the rope ends without any pulling force. 3. Can the children explain how to make the rope straight? Identify that a pulling force is needed. Do both volunteers need to pull? What happens if one child pulls harder than the other but neither child lets go? Explain that the pull force causes tension in the rope. The force of tension travels right through the rope. If both children and the rope are static, then the forces are balanced. If the rope moves left or right, then the forces are unbalanced and the rope moves in the direction of the greater force.	Task 1 SEN: Rope image printed and children to draw the arrows onto the image. Write a simple sentence that explains whether the forces are balanced or unbalanced. LA: Same as SEN but with a simple explanation as to why the forces are balanced or unbalanced. MA/HA: Draw the rope demonstration into their books and draw on the arrows. They need to explain what happens if the forces are unbalanced. Task 2 SEN/LA: Draw each step of the playdough activity (boxes labelled to support their drawings). Challenge: Can they add keywords to any of the boxes to push their learning further?

	Children's Task (1): Record their ideas and understanding from this demonstration into their books. Whole class activity (2): (Practical exploration of forces using playdough/clay/plasticine) 1. Give each table a large, single piece of clay and set it on the table. (TTYP) Are the forces balanced or unbalanced? How do you know? 2. Ask the children to share the clay between them. Then ask what they did to share the clay. Agree that they may have used pulling and twisting forces to rip the clay. 3. Children then can create a shape of their own choice using their piece of clay.. 4. Discuss the types of tension or twisting forces they used on the clay: twisting, pushing, pulling etc. How did each force affect the modelling clay? **Use KO 'Forces can make an object…' diagram. Did any of these points** happen when you made your shape? **Children's Task (2):** Using the box template sheet. Children to record what they did with their clay.	MA: Draw each step of the playdough activity in their boxes. They must write a brief sentence about what is happening in each stage using key vocabulary introduced today. HA: To draw and explain each stage of the playdough activity. Can they draw arrows onto the playdough to show the forces acting on it.
Knowledge and Skills Objectives	**Activity**	**Differentiation**
Lesson Two I can explain that gravity is a force that pulls objects down. Working Scientifically	Starter: Watch this video: https://www.youtube.com/watch?v=E9oKEJ1pXPw Can FF if needed and where appropriate. (TTYP) Why is it that we know exactly what will happen as soon as the man steps off his platform? Why do things fall? Establish that there is a force called weight. Weight is caused by a force field called gravity pulling towards the centre of the Earth. (TTYP) What forces were acting on the astronaut? (TTYP) Was there more than one force happening? Whole class activity: Introduce Isaac Newton and his discovery of gravity: he saw an apple falling out of the tree, which intrigued him immensely.	Task 1 SEN: A pre-prepared results table which just expects them to record the gravitational force acting on each object. A brief summary sentence that identifies the objects that has the most and least gravitational force. LA: A pre-prepared results table to compare mass and gravitational force.

	Explain that he spent a lot of time thinking about gravity and how it pulls objects towards the centre of the Earth. It is a force that we measure in newtons (N) as a tribute to Isaac Newton. Explain that mass of an object and the force of gravity between Earth and objects are different. Tell children that we are going to investigate this. (TTYP) What can we use to measure the mass of the object? (small weighing scales) / force of gravity? (force metres) We will be recording our results onto a table. Teacher to model activity including recording findings. **Children's Task:** Working in small groups, children will explore the relationship between an objects mass and its gravitational force. Plenary: (Explorify activity – Odd one out) **'Defying gravity'.** Three images: bubbles, a plane and dandelion seeds in transit. (TTYP) Which image is the odd one out? Can you explain why?	A brief summary sentence about the results that surprises them the most. MA/HA: A pre-prepared results table to compare mass and gravitational force. A short explanation that describes their findings from this activity. Challenge: What would happen if there was no gravity?
Knowledge and Skills Objectives	Activity	Differentiation
Lesson Three I can identify and describe friction. Working Scientifically	Starter: (Explorify activity – **Zoom in/ Zoom out) 'Black bobbles'.** Several images to flick through – a close up, then each time an image zoomed out of the object. (TTYP) What do you think it is? Why? Can you describe the colours, shapes and textures? What do they think the image is now? Have they changed their minds?	Task: All children working in small groups will engage in the investigation. There will be one person recording for each group and the other children will have a practical role. Results to be photocopied for the group so they all have a set in their books. They will write their own conclusions in their books. SEN: Copy and complete the model conclusion text into their books.

	Background science Friction is a force that occurs when surfaces are in contact and moving against each other. It's this friction between tyres and the road that stops you slipping around when you're on a bike, in a car or on a bus. The repeated friction between tyre and road surface causes the tread (the bit that makes contact with the ground) on the tyre to wear down, if you look closely you'll see evidence of this in the tyre image as you zoom out. <u>Whole class activity:</u> (TTYP) How is friction created? What do you do with cold hands? Why? What happens? Friction is a force between two surfaces that are sliding, or trying to slide, across each other. For example, when you try to push a book along the floor, friction makes this difficult. Friction always works in the direction opposite to the direction in which the object is moving, or trying to move. Friction always slows a moving object down. Investigation context: show image of person at work, who has slipped on a school kitchen floor. Ask: what has caused this person to slip? Take suggestions. Tell the children that the floor was slippery and the person fell as a result. Ask, what can we investigate? Investigation: Which is the most effective floor material to prevent people from slipping in the kitchen? <u>Task (1):</u> Children to explore the properties of floor materials (laminate, stone, concrete, marble, carpet, wood) first at their tables. Observe, feel and discuss. Children to feedback their predictions – Write down their predictions that answer: Which material will prevent people from slipping the best? Why do you predict this? <u>Task (2):</u> Plan fair test together (whole class) asking children to suggest what variables need to change, measure/observe and keep the same. <u>Task (3):</u> Children to work in small groups to investigate our question recording results as they go. Method: Use a force meter to pull a shoe with a weight in over different surfaces to measure the force. Observe performance of the shoe being pulled. Record results. Discuss results – were there any	<u>LA:</u> Given question prompts to write their conclusion. <u>MA/HA:</u> Given a keyword bank to write their conclusion.

	unusual results? How did the shoe move when dragged over the different materials? Similar or different? Conclude results together. Then, children to complete their own conclusion statements using prompt sheets.	
Knowledge and Skills Objectives	Activity	Differentiation
Lesson Four I can identify and explain what air resistance does. Working Scientifically	Starter: Show two objects 1. a piece of paper folded 4 times. 2. flat paper. Discuss which will fall the fastest and why. **Introduce children to the term 'air resistance'. Children to use their KOs to** read the definition of this force. Discuss the effects of air resistance on these different objects. Whole class activity: Discuss different examples of air resistance acting in real life: riding a bicycle, a leaf falling from a tree and on an aeroplane. Practical exploration using a CLEAPSS activity (with a twist): *Making and successfully throwing a boomerang.* *http://primary.cleapss.org.uk/resource-file/p085-making-and-successfully-throwing-a-boomerang.pdf* Explain that children will work in pairs and create two different boomerangs (templates provided). One solely made from A4 paper and the other from A3. Children to explore the effect of air resistance on the different size of boomerang. They should throw the boomerang from the same height and at the same force (teacher to encourage this: one person does the throwing and the other makes the observations.) Explore their throwing and height levels before recording results. Children to use their stop watches to time the length of time the A4 boomerang takes to fall to the floor (3 times) and then the same with the A3 boomerang.	Task: All children to work in pairs gathering results and recording them onto a table. SEN/LA: A group conclusion to be written into books. MA/HA: Independent conclusions to be written into books.

	Children's Task: To work in pairs exploring the effect of air resistance. Record the times onto their sheets. Plenary: IOP Marvin and Milo postcard activity to try: **'Book Launch'** 	
Knowledge and Skills Objectives	Activity	Differentiation
Lesson Five I can describe and explain how water resistance works. Add w/s here	Starter: (Explorify activity – **Odd one out) 'Sleek designs.' Three images: a** penguin swimming, a diver and a boat. (TTYP) Which one is the odd one out? Start to generate a discussion about the similarities and differences of each of these things in the water. What about the shapes they are? Whole class activity (1): Recap air resistance (TTYP). Explain that as well as having air resistance, there is a force called water resistance. (TTYP) What could this be about? Can you use what you know about air resistance to help you? Children then to use KOs to check their definitions – were they correct? Explain that water resistance is also the force responsible for making it difficult for us to move through the water. It acts between a moving object and the water molecules around it, slowing the object down. Water resistance is a type of friction. Boats are streamlined in design to reduce	Task (1) SEN/LA: Children to be given a picture of a boat. They should label the forces acting on the boat out at sea. Compose a group sentence about water resistance and write this underneath. MA: Given a picture of a boat. They should label the forces acting on the boat. Write a short description about what water resistance is. HA: Given a picture of a boat. They should label the forces acting on the boat.

	water resistance, allowing them to move through the water faster. (TTYP) What does streamlined mean? Refer back to first three images. How are they streamlined? (TTYP) Look at the bodies of some aquatic animals to reinforce understanding of **new terminology** 'streamlined.' Look at water resistance in action – explore the forces acting on a boat. Can children work this out with their partner. **Children's Task (1):** Explain what water resistance is in their books. Whole class activity (2): What type of shape creates the least amount of resistance in water? (TTYP) **Children's Task (2):** Explore this further in tables. Children will be provided with a container of water and some plasticine. Children should create four different shapes using the plasticine. Explore which shapes fall to the bottom of the container the quickest compare each of their shapes. Why does this happen? Pic collage for books and quotes of what children are learning or have noticed in their exploration. Plenary: Share experiences of the task and which shapes were quicker/ slower to fall. Why do you think that might be?	Explain how the boat is staying afloat with the forces acting on it including water resistance. Extension: Can you draw and label another example of water resistance in action?
Knowledge and Skills Objectives	Activity	Differentiation
Lesson Six I can describe different mechanisms. Working Scientifically	Starter: Recap! Give children some time to create a mind map (A5 paper) which details all of their learning during our '**Forces**' topic so far. Can be stuck into books for assessment purposes.	Task: SEN: Sort mechanisms into the correct boxes.

	Whole class activity: (TTYP) What are mechanisms? A mechanism is a device that changes an input force or motion into a different output force or motion. Some mechanisms make work easier to do by allowing a smaller force to have a greater effect. Introduce the three types of mechanisms: pulleys, levers and gears. What do you know about these? Children to use KO to look at the definitions. Activity (1): Sorting task on tables. Can children sort the series of objects into the category of the mechanism it has e.g. a seesaw, a toilet, a bicycle etc. Use the above activity as a stimulus to consolidate understanding of each mechanism: Pulleys – are used to help you use a small force to lift a large load. Gears – Gears are wheels with teeth or indentations, which lock and turn one another. Gears can be used to change the speed, force or direction of motion. Levers – A lever always rests on a pivot. A lever has the point where you push or pull, the point where it pivots and the point where the work is done. Show lots of examples for each mechanism. **Children's** Task: To explain what each mechanism does using illustrations to support answers. Plenary: Can you add **today's** learning to your mind map?	LA: Fill in the gap task to complete a definition for each mechanism introduced today. MA: Create their own definition for each mechanism using the image provided as a support. HA: Create their own definitions and illustrations for each mechanism. Challenge: Design your own machine that incorporates at least one of the mechanisms we looked at today. Explain what it is used for and how it works.

Year Group: Year 5	Term: Spring 2	Topic: Living things and their habitats

National Curriculum Links

Pupils in Key Stage Two should be taught to:

- 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

Working scientifically

- plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- use test results to make predictions to set up further comparative and fair tests
- report and present findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
- identify scientific evidence that has been used to support or refute ideas or arguments

Prior Learning	Future Learning
• Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans) • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)	• Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. (KS3) • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)

Common Misconceptions

Some children may think:

- all plants start out as seeds
- all plants have flowers
- plants that grow from bulbs do not have seeds
- only birds lay eggs.

Sustainable Development Goals

This global goal would be perfect to fit with this unit of learning.

Add activities here

Catholic Social Teaching

Add activities here

Knowledge and Skills Objectives	Activity	Differentiation
Lesson 1 I know how plants reproduce Add w/s here	Firstly, Mind map what is already known about living things and their habitats. Remind children that they learnt about living things in year 2 and 4. Encourage children to suggest any relevant questions. Look at a flower. Children to try and locate the reproductive parts of the flower (using key vocabulary) Use magnifying glasses and tweezers. Share with the children the functions for each part of the flower. Use ppt to support (Could the children research this?) Watch supporting video which mentions sexual reproduction in plants: https://www.youtube.com/watch?v=R8_ScKzLAfE (this video will cover seed dispersal that was covered in Year 3) Learn about how plants reproduce through seed dispersal: wind, animals or the flower forces them out. Show how this happens with a sunflower. Children to describe the process in their books	Children to draw and label a flowering plant with captions: anther, filament, ovary, ovule, petal, sepal, stigma, style and stamen. Explain how that part of the plant is involved in the reproduction of a plant. LA – Match labels to parts of the plant MA – Independently identify and label the parts of the plant. Explain how some plants reproduce. HA – Independently identify and label the parts of the plant. Explain how some plants reproduce and explain which methods they think are the most effective giving reasons for their answer.
Knowledge and Skills Objectives	Activity	Differentiation

Lesson 2 I can investigate how to grow a new plant Add w/s here	Dissect a plant: root, stem, leaves, bud, flower, petal, tubers. Suggest to the children that we are going to try and re-grow the plant again in soil. Children to observe parts of the plant with magnifying glasses. In groups, children to produce an investigation plan for activity. Use a different plant for two groups. So 3 plants for 6 groups of children. Within the groups focus on replanting different parts of the plant to regrow: root, stem, leaves, bud, flower, petal, tubers. Use quick growing plants (radish, spinach, carrots, marigolds, perhaps use a potato as well and observe over two – three months). Method: Use same amount of soil, plant pot, light and water. Change the part of flower to regrow. Decide same place to grow, outside in garden area or inside the classroom in light Measure the height. Observe: amount of leaves; spread of plant over a period of weeks. Children to predict which part of the plant will grow the best and why. Over the course of the next few weeks, children will measure, record the growth and make careful observations. Review predictions.	LA- Say what they think will happen. MA- Make a prediction about the growth of new plants. HA- Make a prediction about the growth of new plants giving evidence to support their thoughts.
Knowledge and Skills Objectives	**Activity**	**Differentiation**
Lesson 3 I can describe the life process of reproduction in plants around the world. Add w/s here	*Add prior learning tasks* Plant life process Remind children that in lesson 1, they learnt about the sexual reproduction of plants. **Tell the class that some plants, such as moss and ferns don't have** seeds, just tiny spores. Task 1: Watch video clip to reinforce: https://www.youtube.com/watch?v=TKcmF4ITn6E show supporting diagrams. Task 2: Learn about different plants around the world, such as cactus and tropical plants and their life processes. How do they differ from plants in our country?	LA- Children to label and caption the life process of a fern and cactus plant. Focus on similarities and differences. MA- Children to draw, label and caption the life process of a fern and cactus plant. Focus on similarities and differences. HA- Children to draw, label and caption the life process of a fern and cactus plant. Explain how each plant is adapted to suit **it's environment.**

	Summarise the different types of reproduction that children have learnt about.	
Knowledge and Skills Objectives	**Activity**	**Differentiation**
Lesson 4 I know about the life cycle of different mammals and amphibians. Add w/s here	*Add prior learning tasks* Intro: *children started learning about mammals and amphibians in Year 1*. Ask, how are amphibians and mammals different or similar? Children to feedback. How are the life cycles different ? tell the children that: *The life cycle of an amphibian has three main stages (egg, tadpole, adult). Lives part of life cycle (develops) in the water and finishes life cycle (developing) on land. Mammals life only on land (with a few exceptions). A born alive from their mother after they developed as an embryo inside her. Can the children find this out through research? How are the children working scientifically in this lesson?* Conclude how the life cycles are different.	LA- Label the life cycle of a mammal and an amphibian MA- Using research sheets, compare the similarities and differences of the life cycles of an amphibian and a mammal. HA- Explain the stages of each stage of an amphibians life cycle using diagrams to support their explanations.
Knowledge and Skills Objectives	**Activity**	**Differentiation**
Lesson 5 I know about the life cycles of birds and insects. Add w/s here	*Add prior learning tasks* *Children started learning about birds and insects in Year 1*. Ask, how is the lifecycle of birds different or similar to insects? Children to discuss. Feedback. Task 1: Using research sheets, draw diagrams and use explanations to describe lifecycle of a cuckoo, penguin and a humming bird. Compare the lifecycles. How are they different / similar? Task: 2: Using research sheets, draw diagrams and use explanations to describe lifecycle of insects: honey bee (queen) Mason bee (different form the honey bee) and a fly. Compare the lifecycles. How are they different / similar?	In pairs, create a pic collage to show the life cycle of a bird and of an insect. These will be printed to stick in books. Challenge- *compare the life cycles of an insect and a bird. What similarities or differences are there?*

	Task 3: Compare the similarities and differences of an insect and bird.	
Knowledge and Skills Objectives	Activity	Differentiation
Lesson 5 I know ..... Add w/s here		
Applied Write opportunities:		
Enrichment Opportunities		
Assessment Opportunities		
• Can present their understanding of the life cycle of a range of animals in different ways e.g. drama, pictorially, chronological reports, creating a game • Can identify patterns in life cycles • Can compare two or more animal life cycles they have studied • Can explain how a range of plants reproduce asexually		
Key Vocabulary		
Tier Two: Stamen, stigma, anther, style, ovary, ovule, filament, sepal, reproduction, dispersal, pollination, cross-pollination germination Tier Three:		

SS John Fisher & Thomas More Catholic Primary School

A Voluntary Academy

Year Group: Year 5	Term: Spring 2 & Summer 1	Topic: Properties of materials

National Curriculum Links

Pupils in Key Stage Two should be taught to:

- 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.
- 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.
- Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.
- 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, including changes associated with burning and the action of acid on bicarbonate of soda.

Working Scientifically

- plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- use test results to make predictions to set up further comparative and fair tests
- report and present findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
- identify scientific evidence that has been used to support or refute ideas or arguments

Prior Learning	Future Learning
• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)	• Chemical reactions as the rearrangement of atoms. (KS3) • Representing chemical reactions using formulae and using equations. (KS3) • Combustion, thermal decomposition, oxidation and displacement reactions. (KS3) • Defining acids and alkalis in terms of neutralisation reactions. (KS3)

• 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. (Y3 - Forces and magnets) • Compare and group materials together, according to whether they are solids, liquids or gases. (Y4 - States of matter) • 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). (Y4 - States of matter) • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. (Y4 - States of matter)	• The pH scale for measuring acidity/alkalinity; and indicators. (KS3)

Common Misconceptions

Lots of misconceptions exist around reversible and irreversible changes, including around the permanence or impermanence of the change. There is confusion between physical/chemical changes and reversible and irreversible changes. They do not correlate simply. Chemical changes result in a new material being formed. These are mostly irreversible. Physical changes are often reversible but may be permanent. These do not result in new materials e.g. cutting a loaf of bread. It is still bread, but it is no longer a loaf. The shape, but not the material, has been changed.

Some children may think:

- thermal insulators keep cold in or out
- thermal insulators warm things up
- solids dissolved in liquids have vanished and so you cannot get them back
- lit candles only melt, which is a reversible change.

Sustainable Development Goals & Social Catholic Teaching

These Sustainable Development Global Goals would be perfect to fit with this unit of learning:

These Catholic Social Teaching strands would be perfect to fit with this unit of learning:

Applied Write Opportunities	Enrichment Opportunities
• Write a NC report about an invention of their choice. Explain how the material is perfectly suited to its purpose.	

Assessment Opportunities
• Can create a chart or table grouping/comparing everyday materials by different properties • Can use test evidence gathered about different properties to suggest an appropriate material for a particular purpose • Separate mixtures by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture. • Explore a range of non-reversible changes e.g. rusting, adding fizzy tablets to water, burning. • Carry out comparative and fair tests involving non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced? • Research new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton). • Can group solids based on their observations when mixing them with water • Can give reasons for choice of equipment and methods to separate a given solution or mixture such as salt or sand in water • Can explain the results from their investigations

Key Vocabulary
Tier Two: add vocab here Tier Three:

Knowledge and Skills Objectives	Activity	Differentiation
Lesson 1 I know about the different states of matter. *Add w/s here*	Add prior learning activity here Display the following questions and invite pupils to discuss what they already know about different states of matter. There will be lots of misconceptions (not covered in previous year group). Pupils to share responses.	Pupils will work together to sort each picture according to its properties, whether it is a solid, liquid or gas. Discuss reasons for sorting each item. Listen to explanations for individual choices and address misconceptions.

	What is a solid? What is a liquid? What is a gas? The properties of solids include: solids stay in one place and can be held, solids keep their shape, they do not flow like liquids, solids always take up the same amount of space, they do not spread out like gases, solids can be cut or shaped, even though they can be poured, sugar, salt and flour are all solids. Each particle of salt, for example, keeps the same shape and volume. The properties of liquids include: liquids can flow or be poured easily, they are not easy to hold, liquids change their shape depending on the container they are in, even when liquids change their shape, they always take up the same amount of space, their volume stays the same. The properties of gases include: gases are often invisible, gases do not have a fixed shape, they spread out and change their shape and volume to fill up whatever container they are in, gases can be squashed.	Do pupils disagree with some classifications? Why? Pupils to work in mixed ability pairs to sort **items/objects. Take photos of each pair's** work for books. Will this task 2 hours?
Knowledge and Skills Objectives	**Activity**	**Differentiation**
Lesson 2 I can explain the different states of matter Add w/s here	Add prior learning activity here Pupils will use the information that they have learnt previous to draw and explain the 3 different states of matter. Show video which video? that explains why each state behaves like they do. Discuss particles and how their make up explains their behaviour. Movement of particles in solids, liquids and gases Particles in solids have the least energy and have less space to move. The particles **don't move and it keeps it's shape.**	Watch the following video https://www.bbc.co.uk/bitesize/topics/zkgg87h/articles/zsgwwxs Pupils will use post it notes to draw a particle model for a solid, liquid and gas. https://www.youtube.com/watch?v=-_Whwdh7D6M LA- Draw a particle model for a solid, liquid and a gas

	Particles in liquids have more energy than solids and have space to room, this allows it to flow/pour. Particles in gas have even more energy than liquids. They easily move far apart and spread out through the available space.	MA- Draw a particle model for a solid, liquid and a gas Write some of the properties for each diagram. HA- Draw a particle model for a solid, liquid and a gas. Explain how the arrangement of particles affects how it behaves. Year 4 children do this. Can this be extended for Year 5?
Knowledge and Skills Objectives	**Activity**	**Differentiation**
Lesson 3 I can explain how materials can change states Add w/s here	Materials can be heated or cooled to change state. What is the difference between reversible and irreversible. Some changes of state are reversible and others are irreversible. Melting When a solid is heated, its temperature rises and its particles gain energy until it reaches its melting point. The particles have enough energy to move and break away from their neighbours so that the solid melts. https://www.stem.org.uk/resources/elibrary/resource/34080/understanding-reversible-change As the solid cools it loose energy and solidifies again. Evaporation Fill kettle and turn on. Watch as the kettle heats up and causes the water to heat up. The water (liquid) gains energy and the particles move about much more freely and collide regularly. This continues until the particles move around rapidly and have enough energy to escape. The water boils and the particles escape in the form of steam (water vapour).	What does this worksheet look like? Can it be inserted? LA- Complete changing state worksheet. MA- Use changing state worksheet as a guide to create an information page to show how water changes state. HA- Pupils to create an information page to show and explain different examples of changing state. Draw a diagram with a caption to show an example of each change.

	Condensation Use a cold metal oven tray to hold above the kettle. This will show the water vapour (gas) condenses onto the tray and lose energy. It returns to a liquid. Freezing When a liquid cools enough, it sets or freezes. The particles have low energy and cannot move. It is now a solid.	Note: teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning.
Knowledge and Skills Objectives	**Activity**	**Differentiation**
<u>Lesson 4</u> I can explain how The Water Cycle works Add w/s here	Recap the changes of state- evaporation and condensation. Quickly discuss the properties of solids, liquids and gases. Watch this video about the water cycle. https://www.youtube.com/watch?v=al-do-HGuIk Identify whether each action is condensation or evaporation. washing drying on a line, mirror misting in a bathroom, paint drying, puddles drying up, hair dryer, water droplets on the inside of a window, a **plant's leaf wilting, water droplets on a cold can of coke**	Pupils will create water cycle models using sharpies and plastic bags. Once finished these to be displayed in the classroom. Label key terminology and explain what happens at each section. Take a photo of the projects displayed for books. Pupils to be expected to explain their water cycle model in a small group. LA- use key vocabulary and point to each part of the model. draw a picture of their model label solid, liquid and gas.

	Create water cycle models – THIS IS DONE IN Year 4 for the topic, The Water Cycle On transparent bags, draw a diagram of the water cycle. Include the sun, clouds and water accumulation. Fill bags up to the line with coloured water.	MA- Pupils will draw their experiment and explain how their model shows the water cycle. HA- Pupils will independently draw and explain their model and use key terminology to describe the water cycle process in detail. Challenge- How does temperature affect the rate of evaporation? Pupils will be expected to explain that heat causes the rate of evaporation to increase. Things will dry quicker in hotter temperatures and slower in colder temperatures.
Knowledge and Skills Objectives	**Activity**	**Differentiation**
Lesson 5 I know about reversible and irreversible changes Add w/s skills here	Watch this video that explains reversible and irreversible changes. https://www.bbc.co.uk/bitesize/topics/zcvv4wx/articles/z9brcwx Model some examples of reversible and irreversible changes and get the pupils to predict whether or not each action is reversible or irreversible. Can they work scientifically here???? Irreversible changes A change is called irreversible if it cannot be changed back again. In an irreversible change, new materials are always formed. Sometimes these new materials are useful to us. Heating Heating can cause an irreversible change. For example you heat a raw egg to cook it. The cooked egg cannot be changed back to a raw egg again. Mixing	Pupils will fill out a table, making a prediction of whether the change is reversible or irreversible. Use pictures on ppt to support predictions about each change. Pupils to create a poster about reversible and irreversible changes. They can use resources as a support.

	Mixing substances can cause an irreversible change. For example, when vinegar and bicarbonate of soda are mixed, the mixture changes and lots of bubbles of carbon dioxide are made. These bubbles and the liquid mixture left behind, cannot be turned back into vinegar and bicarbonate of soda again. Burning Burning is an example of an irreversible change. When you burn wood you get ash and smoke. You cannot change the ash and smoke back to wood again. Irreversible changes are permanent. They cannot be undone. For example you cannot change a cake back into its ingredients again. Reversible changes Reversible and irreversible reactions are different. A reversible change is a change that can be undone or reversed. If you can get back the substances you started the reaction with, that's a reversible reaction. A reversible change might change how a material looks or feels, but it doesn't create new materials. Examples of reversible reactions include dissolving, evaporation, melting and freezing.	
Knowledge and Skills Objectives	Activity	Differentiation
Lesson 6 I can identify and explain which substances dissolve Add w/s here	**Ask pupils, "What does** dissolve **mean?" Present the pupils with the different** scenarios on ppt. add the scenarios to the planning Which one applies to the sugar cubes in the water? Encourage discussion. Dissolving occurs when the particles of certain solids mix with the particles of certain liquids. When a material dissolves, it looks like it disappears, but it has actually just dissolved in the liquid to make a transparent solution. A	Explain that we are going to try and mix some different solids into a liquid to form a solution. Make a prediction by ticking or crossing whether the solid will dissolve or not.

	solution is formed when a solid dissolves in a liquid. Not all solids will dissolve, and not all liquids will allow solids to dissolve. When you mix sugar with water, the sugar dissolves to make a transparent solution. What is the difference between dissolving and melting? Soluble or Insoluble? What does each word mean? Which word describes the sugar? Clarify the meaning of each word.	Each table will have a cup of warm water. Investigate whether the 7 solids dissolve or not: soil, salt, sugar, flour, coffee, sand and rice. Discuss the independent, control and dependant variables in the investigation. SEN/LA will have missing word sheets to support their findings.
Knowledge and Skills Objectives	**Activity**	**Differentiation**
Lesson 7 I can investigate which materials are thermal insulators and conductors. Add w/s here	What does thermal mean? Where have you heard this word before? Get pupils to touch the table. Does it feel hot or cold? Touch a window, touch a metal door handle. Why do these objects feel cold? Explain that they feel cold because of heat transfer. Heat is transferred from hot to cold areas. If something feels cold then it is because it is a colder temperature and therefore the heat from their body is transferred to the colder object. Heat always transfers from hot to colder objects. Pupils will work together to sort which materials they think are insulators and conductors. Heat can travel easily through thermal conductors. Metals are good thermal conductors, as they allow heat to move through them. Thermal conductors are used to make items that need heat to travel through them, like a pan or a radiator. Thermal insulators do not let heat travel through them easily. Some fabrics, wood and plastics are good thermal insulators. Thermal insulators can keep heat out or in. For example, a vacuum flask stops heat from the air travelling through to the food or drink inside,	Pupils will help the teacher to complete the thermal investigation. The task is to investigate which material is the best at keeping a cup of tea hot. How will you know if it is a good insulator or a good conductor? Poor hot tea into different containers and wait 2 minutes. Pupils will help the teacher to take measurements of the tea using thermometers at set intervals. 1. Pupils to identify the independent, dependent and control variables. 2. Make a prediction. 3. Complete the experiment, pupils to fill out table at set times. 4. Write an explanation of results. SEN/LA will have missing word sheets and partners to support when filling out data.

	keeping it cool. A coat stops the heat from your body travelling through to the air outside, keeping you warm.	
Knowledge and Skills Objectives	**Activity**	**Differentiation**
Lesson 8 I can investigate which materials are electrical insulators and conductors. Add w/s here	https://www.bbc.co.uk/bitesize/topics/zcj6yrd/articles/zb6mt39 Conductors Some materials let electricity pass through them easily. These materials are known as electrical conductors. Many metals, such as copper, iron and steel, are good electrical conductors. That is why the parts of electrical objects that need to let electricity pass through are always made of metal. Metal is used in plugs to allow electricity to transfer from the wall socket, through the plug, and into a device such as a radio or TV. In a light bulb, the metal filament conducts electricity and causes the light bulb to light up. Insulators Some materials do not allow electricity to pass through them. These materials are known as electrical insulators. Plastic, wood, glass and rubber are good electrical insulators. That is why they are used to cover materials that carry electricity. The plastic covering that surrounds wires is an electrical insulator. It stops you from getting an electrical shock.	In this project you will make and demonstrate a simple electric circuit. You will learn about electrical conductors (such as wires and metals), insulators (such as plastic coating on the wire) and the concept of electrical circuits. n electric current is a flow of microscopic particles called ELECTRONS flowing through wires and electronic components. It can be likened to the flow of water through pipes and radiators, etc. As water is pushed through pipes by a pump, electric current is pushed through wires by a battery. Electricity always flows from negative to positive. Pupils will create simple circuits to ensure that the circuit is complete and the component works (lightbulb/buzzer etc) Break the circuit and use crocodile clip wires attached to different sides of the materials they are testing. Pupils will

		record whether the material is an electrical conductor or insulator. SEN/LA will work in mixed ability pairs for the experiment. Template to record results on. MA/HA- Pupils to design a safety plug to keep young children safe.
Knowledge and Skills Objectives	**Activity**	**Differentiation**
Lesson 9 I can investigate how to separate mixtures. Add w/s here	What is a filter? What would you do if your paddling pool was full of stones, leaves and bugs? You could empty it out and start again or you could filter out the debris. Filters are used to separate mixtures. For example a fishing net is a type of filter, it traps the fish, but lets the water out as water is small enough to pass through the holes, but the fish is too big. When you boil vegetables and then sieve them to remove the water, that is also filtration. The sieve filters out the vegetables separating them from the water. Can you think of any more examples of a filter? Soluble or insoluble Filtration only works when the solid you want to separate is insoluble, **which means it doesn't dissolve in water. Imagine a cup of tea with sugar** added, the sugar dissolves in the hot tea, it is no longer a solid particle. If you pass the tea through a filter, the sugar would not be left behind, but if **you added sand to your tea, which is insoluble (doesn't dissolve) this would** be left behind in the filter. We can filter sand. We have already left salt water solution on the window sill to observe separation through evaporation in class.	Filtration Activity Materials • Funnels • Filter Paper – available here or you can use kitchen roll or coffee filters. • Beaker • Warm water • Sugar • Sand Method 1. Pour about 300 ml of warm water into a beaker. 2. Add about a tablespoon of caster sugar and stir until it dissolves completely. 3. Place filter paper inside a funnel and place the funnel over a beaker. 4. Slowly pour your sugar solution into the funnel, observing what happens. 5. Repeat with fresh water and sand.

		Results The sugar dissolved in the water passes through the filter into the beaker below. The sand gets trapped by the filter with just water passing through into the beaker below. Pupils will design the perfect tea bag. They will explain how their tea bag lining will be suited to the task. SEN/LA will have support and differentiated worksheets to help support thinking and explanations.