St Joseph's Catholic Primary School

Science Medium Term Plan Overview

YEAR 5 LIVING THINGS AND THEIR HABITATS

Knowledge & understanding statutory requirements:

5a1: describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
5a2: describe the life process of reproduction in some plants and animals.

Upper KS2 - Working Scientifically

Statutory Requirements

uks2w1: planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
uks2w2: taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
uks2w3: recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
uks2w4: using test results to make predictions to set up further comparative and fair tests
uks2w5: reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
uks2w6: identifying scientific evidence that has been used to support or refute ideas or arguments.
Pupils should study and raise questions about their local environment throughout the year. They should observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall.
Pupils might work scientifically by: observing and comparing the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences. They might try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. They might observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow.

Lessons:

1. To compare life cycles of different amphibians e.g frogs, salamanders and axolotls.
2. To compare the life cycles of different mammals e.g the human, the kangaroo, the platypus. Create life cycle diagrams and explain them.

3. To compare the life cycle of different insects eg. butterfly and two species of bee (honey bee and mason bee). Create life cycle diagrams and explain them.
4. Compare the life cycles of different birds. E.g chicken , common cuckoo. Create life cycle diagrams and explain them.
5. To compare the life cycles of mammals, amphibians, insects and birds. Play challenge games.
6. To describe how flowering plants reproduce. Learn about the purpose of a flower and its basic structures to explain how it reproduces.
7. To investigate whether a new plant will grow from cuttings. To learn that, unlike animals, pieces broken off from plants can grow into another individual organism e.g by cutting up a potato or tomato plant to see which parts will grow into a new individual. They can also learn that this is used by farmers to create as many crops with identical characteristics such as planting potato tubers.
8. To explain how animals sexually reproduce – that animals reproduce sexually and each individual has a male and a female parent from which they inherit various traits. Explain the process of animal reproduction, including the stages of sperm and egg production, mating, fertilisation, and the growth of a zygote into an embryo.

Vocabulary

life cycles, amphibian , frogs, salamanders, axolotls, metamorphosis, eusocial, petal, anther, sepal, carpel, stigma, style, ovary, pollen grain, pollen tube, ovule, cutting, sexual reproduction, male , female, sperm, egg, fertilisation, zygote, embryo

YEAR 5 ANIMALS INCLUDING HUMANS

Knowledge & understanding statutory requirements:

5b1: describe the changes as humans develop to old age.

Pupils should draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty.
Pupils could work scientifically by researching the gestation periods of other animals and comparing them with humans; by finding out and recording the length and mass of a baby as it grows.

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uks2w6: identifying scientific evidence that has been used to support or refute ideas or arguments.

Lessons:

1. To compare the gestation periods of different animals. Look at the gestation periods of different mammals, round to the nearest 10 day, use this information to create a bar chart (understanding why a bar chart is used rather than a line graph) , identify patterns and which mammal has the longest gestation period.
2. To explain how the human foetus develops. Learn that a baby takes 40 weeks to develop in the womb. Complete a table by rounding the weight of the embryo/foetus at the various stages of gestation to the nearest 100g. Use this information to create line graph and discuss at which point he foetus gains the most weight.
3. To create timeline to show the development of a child.
4. To discuss when a child should be able to perform different activities- think about how children develop physically, mentally and emotionally as they get older. Consider tasks a child might be permitted to do independently such as ride a bike, cross the road etc. Place in order of age required, and give reasons for judgements.
5. To describe the changes involved with puberty. Explore a range of male and female body and mind changes (eg. sexual thoughts and feelings) as the child changes into an adult - in females(e.g. menstruation, development of hair on the body, nipples, breasts) and in males (e.g erections, body hair, production of semen).
6. To explain some of the difficulties involved with old age and how they can be treated. Consider ways in which elderly people can improve their lives and communities and families can care for elderly people. Give advice in different scenarios. (Possible links with R.E and the Common Good as well as citizenship)
7. To create a timeline of a human life. Consider changes at important stages such as: embryo, foetus, newborn, child, adolescent, young adult, middle-aged adult and an old adult.

Vocabulary

Gestation period, human foetus, puberty ,womb, menstruation, period, nipples, breasts, fat, vagina, muscles, body odour, acne (spots), erections, penis, semen, frail, new-born, child, adolescent, young adult, middle-aged adult, old/elderly adult.

YEAR 5 PROPERTIES AND CHANGES OF MATERIALS

Knowledge & understanding statutory requirements:

5c1: 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
5c2: know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
5c3: use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
5c4: give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
5c5: demonstrate that dissolving, mixing and changes of state are reversible changes
5c6: 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
Pupils should build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt about magnetism in year 3 and about electricity in year 4. They should explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda. They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.
Note: Pupils are not required to make quantitative measurements about conductivity and insulation at this stage. It is sufficient for them to observe that some conductors will produce a brighter bulb in a circuit than others and that some materials will feel hotter than others when a heat source is placed against them. Safety guidelines should be followed when burning materials.
Pupils might work scientifically by: carrying out tests to answer questions, for example, which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. They might research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials.

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uks2w6: identifying scientific evidence that has been used to support or refute ideas or arguments.

Lessons:

1. To explain how to recover a substance from a solution – to know what a substance and a solution are. Learn that substances cannot be separated by filtering because particles have spread out and are not in clumps that can be blocked by a sieve. Investigate the bet places to put a cup of salt solution so that the water evaporates more quickly. Choose 4 locations and measure the amount of water in the container over the course of 7 days. Transfer results to a line graph and use this to answer the question.
2. To group materials according to their properties. Investigate the properties of 10 materials. Predict and investigate whether the materials are electrical conductors, transparent, strong, thermal conductors or magnetic. Record results in a table and then a Venn diagram.
3. To investigate which materials are soluble in water – learn that when a solute dissolves in a solvent to create a solution it particles are spread out so they can no longer be retrieved by filtering. Eg. investigate whether sand, sugar, salt, flour , iron filings will dissolve in water. Record results in a table and then display then in a Venn diagram . Consider how one could separate the mixtures and solutions.
4. To investigate the hardness of materials and place them in order of hardness. Investigate whether 5 different materials can be scratched by 4 different objects of increasing hardness. Use the results to place in order of hardness.
5. To suggest ways in which different mixtures can be separated. Learn about 6 different methods for separating solutions – picking out by hand, decanting, sieving, filtering , using a magnet and evaporation. Consider 6 different mixtures/solutions and discuss and explain the best way to separate each. Attempt to do this using the chosen method. Discuss and explain how successful this was.
6. Explain why materials are used for different purposes. Identify the materials that 4 different objects are made from and explain why they have been chosen with

reference to their physical properties. Describe their physical properties and use 6 different materials e.g leather, metals, plastics, wood, fabrics and glass.

7. Explain the advantages of new materials and how they were created. E.g learn about the origins of Post-It Notes, wrinkle-free cotton, polar fleece and Gore-Tex. Present this information showing: when and by whom they were invented; their advantages and disadvantages and their common applications.
8. To identify if a change is easily reversible and how to reverse it. Learn that some physical changes are readily reversible (e.g. freezing and melting) while some are not (irreversible) such as burning because new materials have been produced. Examine about 11 different physical changes of materials. Identify and explain whether they can be easily reversed and explain how or why or why not.

Vocabulary

Substance, solution, evaporate, electrical conductors, transparent, strong, thermal conductors, magnetic, soluble, solute, solvent, dissolve, particles, mixture, Post-It Notes, wrinkle-free cotton, polar fleece, Gore-Tex, reversible and irreversible reactions

YEAR 5 EARTH AND SPACE

Knowledge & understanding statutory requirements:

5d1: describe the movement of the Earth, and other planets, relative to the Sun in the solar system
5d2: describe the movement of the Moon relative to the Earth
5d3: describe the Sun, Earth and Moon as approximately spherical bodies
5d4: use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.
Pupils should be introduced to a model of the Sun and Earth that enables them to explain day and night. Pupils should learn that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a dwarf planet in 2006). They should understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones).
Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.
Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus.
Pupils might work scientifically by: comparing the time of day at different places on the Earth through internet links and direct communication; creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day; finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks.

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Lessons:

1. To research and compare the different planets in the solar system- learn about 3 different planet classification – terrestrial, gas giant and ice giant. Discuss various ways of comparing, grouping and ordering the planets.
2. To explain how the Earth and the other planets in the solar system move. Learn that ancient astronomers developed the geocentric model because it was the best explanation available at the time. Learn that the heliocentric model was superseded it for scientific reasons- because it agrees more closely with observations. Draw diagrams of the Sun and eight major planets of the solar system and place them in order of distance from the sun.
3. To explain how the Moon moves. Learn about how the Moon moves around the Earth and theories of the Moon's formation. Create a fact file and diagrams showing the movement of the Earth and Moon.
4. To explain how the Moon's appearance appears to change when viewed from Earth. Draw diagrams to show the 8 phases of the Moon and why the Moon's appearance appears to change.
5. To explain how the solar system was formed. Learn that a cloud of gas and dust collapsed under its own gravity, compressing the centre until thermonuclear fusion began and the Sun was formed. Learn that the planets and other bodies accreted from smaller objects over time because of gravity.
6. To compare the sizes of the planets in the solar system. Learn about the 3 different planet groups- terrestrial, gas giant and ice giant. Use an 'Earth ruler' to measure the diameter of the planets in Earth diameters in order to compare them to the

Earth. Use a formula to calculate their true size. Record data in a table and look for patterns.

7. To explain how day and night are caused. Learn that day and night are caused by the rotation of the Earth and that the Sun only appears to move across the sky.
8. To make a sundial and explain how it works. Use a gnomon (shadow caster) On a sunny, rain and wind-free day, calibrate the sundial by fixing it in position and marking where the shadow of the gnomon falls at 9am, 10am, 11am, 12pm, 1pm, 2pm and 3pm Predict where the 4pm shadow line would fall.

Vocabulary

Solar system, planets, terrestrial, gas giant, ice giant, Geocentric model, Heliocentric model, moon, astronomers, Mercury, Earth, Jupiter, Uranus, Sun, Venus, Mars, Neptune, Theia, Lunar Cycle, New Moon , Waxing Crescent, Half Moon, waxing Gibbous, Full Moon, Waning Gibbous, Half Moon, waning Crescent, approximately spherical, compressing, gravity , thermonuclear fusion, formula, 'Earth ruler' , diameter, terrestrial, gas giant and ice giant, rotation, rotate, sundial, gnomon (shadow caster)

YEAR 5 FORCES

Knowledge & understanding statutory requirements:

5e1: explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
5e2: identify the effects of air resistance, water resistance and friction, that act between moving surfaces
5e3: recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

Pupils should explore falling objects and raise questions about the effects of air resistance. They should explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. They should experience forces that make things begin to move, get faster or slow down. Pupils should explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel. Pupils should explore the effects of levers, pulleys and simple machines on movement. Pupils might find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.
Pupils might work scientifically by: exploring falling paper cones or cup-cake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective. They might explore resistance in water by making and testing boats of different shapes. They might design and make products that use levers, pulleys, gears and/or springs and explore their effects.

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Lessons:

1. To explain how a lever works. To learn that a lever is simple machine that can give a mechanical advantage. Set up levers with a fulcrum, beam and load and investigate how far from the fulcrum different forces (weights) need to be in order to balance the load. Transfer results from a table to a line graph and attempt to find a relationship between the force required and the distance from the fulcrum.
2. To explain why objects fall to Earth. Learn that objects fall to Earth due to the force of gravity. Explore why people don't fall off the 'bottom' of the Earth and why the Moon does not fall out of the sky. Investigate the force of gravity by weighing 5 objects in grams, and then measuring the pull between them and the Earth using a force meter, measuring the force in Newtons (N). Look for a relationship between their two measurements. Ensure the children understand the difference between mass measured in grams and weight/force measured in Newtons.
3. To make and calibrate a force meter and explain how it works. Use known masses to calibrate a force meter, adding a sensible scale.
4. To investigate the effects of air resistance. To learn that air resistance can be put to use in devices such as parachutes. Investigate how the canopy size affects a parachute's rate of decent. Then construct 4 parachutes with different canopy areas and predict and then measure how long they take to descend from a given height. Take each measurement 3 times and calculate the mean. Show results in a line graph. Ensure this is a fair test, and that tests are repeated to gain more accurate data. Attempt to answer their scientific question using the results and graph.
5. To identify when objects are experiencing high or low water resistance. To learn that water resistance is a force which prevents an object from moving easily through water. Learn that both high and low water resistance can be desirable in different situations. Look at 6 different situations, identifying whether the object is experiencing high or low water resistance and why.

6. Investigate the effects of friction on different materials. Know that friction is a force which prevents objects from sliding past each other easily when they are in contact with each other. Plan a fair test to investigate the best surface to place on the floor to prevent people from slipping. Predict and then measure the force required to make a shoe containing a mass slide across a range of surfaces. Present results in a table, record in a bar chart and use these to answer the scientific question.
7. To explain how a pulley works. To learn that a pulley is a simple machine that can be used to change the direction of the force, and can also be used to reduce the force required to life a load. Construct a simple pulley from 2 karabiner clips. Use a forcemeter to compare the force required to lift loads with and without the pulley. Record results in a table and then transfer the results to a line graph showing two lines. Compare the two sets of results and use these to explain the advantage that a pulley provides.
8. To explain how a gear train works. Learn that a gear is a toothed wheel and that gears can work together as a gear train in order to change the speed or direction of rotation. Look at 8 different examples of gear trains. Decide whether the driven gear will rotate clockwise or anticlockwise and whether it will rotate more quickly or slowly than the driver.

Vocabulary

Lever, fulcrum, beam, load, weight, mass, Newtons, mass, weight, Newton meter or force meter, air resistance, parachute, canopy, water resistance – push and pull, friction, pulley , gear, rotate, clockwise , anti clockwise