| **Science** **Core Learning****Class 4****YEAR A**  |
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|  | **Autumn Term**  | **Spring term**  | **Summer Term**  |
| **Unit of work**  | Properties and changes of matterEarth and Space | Year 5) Forces(Year 6)Living things and their habitats | (Year 6) Evolution and inheritance(Year and 6) Properties and changes of materials – Sensational science.  |
| **Prior Learning**  | in LKS2 children have studied states of matter covering solids, liquids and gases.  | In LKS2 children have looking at active forces of push and pull. They have looked at magnetic force and attract and repel.  | In LKS1 children have looked at the structure on animals and humans discussing bones and skeletons.  |
| **5 essentials Key learning****nuggets** | MatterHow can all materials be grouped?What happens to sugar when it’s put in tea?How can I separate mixtures?How do I change a materials’ state and can it change back?EarthHow does the solar system move around each other?Does the Earth or the moon move?What is a lunar cycle? | ForcesWhat is gravity? Is it balanced or unbalanced?How do friction and force work together to move things?How does a boat float? Can salt affect water resistance?Can pulleys create better movement?How do gears work?Living thingsWhat is classification?How can we group animals, plants and micro-organisms into groups?Can classification help identify usual and unusual living things? | EvolutionHow do genes choose what living things look like?How does variation enable adaptations in plants and animals? Who has researched and shown evidence on evolution and inheritance?What evidence is there to show evolutionary changes in characteristics?  |
| **Core Learning****Knowledge** | Properties and changes of matter1. Can I compare and group together everyday materials on the basis of their properties, including their solubility and response to magnets
2. Do I Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution?
3. Can I Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating?
4. Can I Demonstrate that dissolving, mixing and changes of state are reversible changes?
5. Can I 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?

Earth and Space i. Describe the movement of the Earth, and other planets, relative to the Sun in the solar system ii. Describe the movement of the Moon relative to the Earth iii. Describe the Sun, Earth and Moon as approximately spherical bodies iv. Use the idea of the Earth’s rotation to explain day and night and the apparent movement of the sun across the skyWorking Scientifically* Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
* Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
* Recording data and results of increasing complexity using scientific diagrams and labels, tables, scatter graphs, bar and line graphs
* Using test results to make predictions to set up further comparative and fair tests
* 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
* Identifying scientific evidence that has been used to support or refute ideas or arguments
 | Forces* 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 effects.

Living things and their environments* Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals
* Give reasons for classifying plants and animals based on specific characteristics

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 results using scientific diagrams and labels
* 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 degree of trust in results, in oral and written forms such as displays and other presentations
 | Evolution and inheritance* Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
* Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents
* Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution

Properties and changes of materials - sensational scienceREVISION BLOCKWorking scientifically* 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
* Identifying scientific evidence that has been used to support or refute ideas or arguments
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| **Key essential knowledge** **(Nuggets)** |  |  |  |
| **Core Learning****Skills** | Properties and changes of matter1. Can I Carry out investigations into the mixing and heating/cooling of solids & liquids. Use sieving, filtration, evaporation and changes in temp to reverse changes then record and outline methods and findings, including graphs, in the form of a technician’s brief?
2. Can I Measure volume and temperatures accurately, taking multiple readings to ensure accuracy and record findings in tables, graphs and diagrams?
3. Can I plan and carry out investigations into how changes in variables affect reactions? Carry out investigations into how changes in variables affect reactions. Make observations of non-reversible chemical reactions
4. Can I plan and carry out investigations into conditions needed for rusting, observing over time, recording findings and suggesting optimum conditions for rusting?
5. Can I Make sample prosthetic wounds using a materials that have been changed in some way and make fake blood through selecting and mixing materials. Record and outline findings orally and visually?
6. Can I create my own ‘new’ gooey material? Do I Know about some famous materials inventors and research and record information about new materials and their possible uses ?

Earth and Space 1. Do I Know that Galileo’s heliocentric view of the solar system was radical for its time and research the key facts/evidence about scientific statements about space?
2. Can I Compare draw conclusions from online images of our night sky at different times of year?
3. Can I Plan and carry out shadow investigations that help support the idea that the Earth moves on its axis, noting variables? Can I Explore time zones and relate this to the movement of the Earth and use logic and knowledge to solve scientific problems?
4. Can I match lunar phases to relative positions of the Moon, Sun and Earth?
5. Can I Explore time zones and relate these to the movement of the Earth, solving time problems?
6. Can I create an A2 poster that presents findings and arguments for a heliocentric solar system?
 | Forces1. Can I identify and label gravity and resistance forces, identifying balanced and unbalanced forces? Plan and carry out an investigation into the forces at play in a bungee jump
2. Can I Investigate the effect of ground friction on the force needed to move a rolling car, taking accurate measurements and recording data effectively? Can I Recommend a ground covering that creates the right level of friction for the safe (but fun) movement of a rolling car on a ride?
3. Can I Investigate and suggest which shape of boat is best to beat the water resistance of a canyon ride river? Can I investigate the impact of salt and fresh water on water resistance?Can I draw diagrams showing the effect of water and air resistance?
4. Can I Set up and carry out a guided parachute investigation exploring shape, size and string length? Can I calculate the area of the parachute and its scaled up speed? Can I recommend parachute material, size and string length in the form of a diagram & record sheet?
5. Can I Complete a lever investigation, noting how the position of the fulcrum impacts on its effectiveness? Can I Complete a pulley investigation noting the correlation between effort required & the number of pulleys? Can I draw diagrams showing the forces, loads, weights and efforts for levers and pulleys?
6. Can I Investigate how gears work, calculate some gear ratios and suggest possible outcomes from given gear ratios

Living things and their habitats1. Meet Linnaeus and learn about his classification system. Can I Create (Y6) and explore (Y5) classification routes for given living things, identifying relatedness?
2. Can I note and identify similarities and differences between animals, micro-organisms and plants? Can i Group animals and plants into broad groups then sub groups according to observable features?
3. Can I create a feature-led sweet classification system?
4. Can I observe and record features and names of leaves found in the local environment? Can I design, make and test classification keys to classify leaves found in the local environment?
5. Can I Write scientific descriptions of unusual living things from around the world? Can I classify unusual living things using their descriptions and online research?
6. Can I design, describe, name and sketch a new creature that sits within a known classification route? Attempt to identify where ‘new’ creatures sit within the Animalia classification system
 | Evolution and inheritance1. Can I use observed characteristics and simple dominant and recessive genes model to’ breed’ dogs?
2. Can I Research variation across a range of animals and plants?
3. Can I Explain how animals and plants might be adapted to extreme environments?
4. Can I research the life and work of Anning, Darwin or Wallace and share as a presentation? Can I use given evidence to attempt to back up evolutionary ideas, presenting logical findings ?
5. Can I Create a cladogram using modern animals?
6. Can I explain scientifically how a given creature has evolved in terms of a specific characteristic?

Properties and changes of materials - sensational science1. Can I Plan and carry out investigations to observe the reaction of given solids in given liquids or mixture? Can I make and record observations, suggesting reasons for their observations? Can I Set up further investigations?
2. Can I Note that scientific knowledge continues to evolve and that scientists don’t always agree?
3. Can I Identify the forces behind a range of phenomena? Can I Carry out investigations into the ways that forces create unexpected effects? Can I Present findings in the form of an educational science demonstration?
4. Can I Explore some scientifically challenging living things to classify? Can I research living things that have been re-classified as scientific knowledge about them has developed?
5. Can I research creatures and plants that demonstrate extreme evolution, identifying key adaptations? Can I Identify the influence of inheritance and environmental factors on humans living in extreme environments?
6. Can I Research and analyse the range of evidence for disputed concepts within the scientific community?
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| **Vocabulary** | Enquiry, solid, liquid, gas, dissolve, soluble, solute, solution, insoluble, heterogeneous/homogeneous mixture, colloid, suspension, reversible, irreversible, changes of state, evaporation, sieving, filtering, heating/coolingVariables, precision, enquiry, solid, liquid, gas, dissolve, soluble, solute, solution, line graph, bar chartVariables, accuracy, enquiry, solid, liquid, gas, reaction, reactant, non-reversible solid, liquid, gas, rust, oxidation, reaction, reactant, experimental.Heliocentric, geocentric, spherical, solar system, astrology, enquiry, evidence, star, moon, planet, sun, Earth, Galileo, CopernicusSpherical, solar system, scale, enquiry, evidence, star, moon, planet, planet names, Earth, sun, orbitEnquiry, evidence, star, sun, moon, sundial, shadow, axis, day, night, time-zone, Greenwich MeantimeEvidence, star, moon, eclipse, light, reflection, telescope, satellite, tide, mass, gravity, phase, lunar, Evidence, direct/indirect light, axis, equinox, solstice, sun, season, hemisphere, longitude, latitude, | Support, fall, Earth, gravity, balancing force, resistance force, weight, Newtons, elasticity, variables, gravity, friction, air resistance, causal relationship, air resistance, friction, moving surfaces, speed, , water resistance, up thrust, friction,  precision, causal relationships, gravity, mechanisms, levers, pulleys, transfers, force,transfersClassification, kingdom, phylum, class, order, family, genus, species, Linnaeus, opinion, characteristics, genus, species, Linnaeus, classification key, opinion, similarities, differences, group, observations, support, refute, botanical illustration, phylum | Offspring, characteristics, vary/variation, inherit/inheritance, environmental variation, Suited/suitable, environment, adaptation, characteristics, vary/variation, inherit/inheritance, natural selection, Evolution, suited/suitable, environment, adapted/adaptation, characteristics, vary/variation, fossils, theory, opinion, cladogram, Mixture, solution, inert, reversible, irreversible, acid, alkaline, oxidation, carbon dioxide, copper oxide, tarnished, physical reaction, chemical reaction, Heliocentric, geocentric, spherical, solar system, astronomy, enquiry, evidence, star, moon, planet, sun, Earth, planet names, orbit, axis, day, night, eclipse, telescope, satellite, tide, mass, gravity, phase, lunar evidence, season, proof, theory, hypothesis, argument, idea, fact, Force, gravity, friction, air pressure, inertia, Newton, push, pull, Classification, kingdom, phylum, class, order, family, genus, species, Linnaeus, opinion, characteristics, Adaptation, environmental factor, evolution, extinction, survival of the fittest, Debate, evidence, dispute, reliable, unreliable, experimentation, theory, argument, theorisation |
| Quick quiz | Name two natural materials. Write the meaning of these properties of materials: a. permeable b. absorbent c. flexible What does it mean if a change is reversible? Can you give on example? What does it mean if a change is irreversible? Can you give an example?What is the difference between a chemical and physical change? What is the correct scientific words for: a. Something that does not dissolve in water b. Water or another liquid that has something already dissolved into it  Name two things that would make something dissolve quicker in water. Tick all the changes below that are irreversible I have a mixture of salt water, fine sand and gravel. If I didn’t want to keep the water at the end, what three steps could I take to separate them and in what order? Name two properties of each of these materials that make them good for doing their jobs. | What are the 2 types of variation called? What is the difference between genetic and environmental variation?  Can you name one animal that lives in a hot climate and explain how it is adapted to its environment? Explain in your own words how light travels.Can you explain how a shadow is formed? Are all shadows the same size? Why? What is meaning of the words reflection? What are the parts of the eye called? What is an incident ray?  | What components do you need to make a simple circuit?. Can you draw a diagram of a simple circuit using the correct symbols? Using the equipment on your table, make the bulb light up. Explain to your partner why this works. What parts of the body make up the circulatory system? What is the function of the red blood cells? What is the function of the white blood cells? 4. What is the function of plasma?What is the function of a platelet?How many chambers does the heart have and what are their names? Do veins carry only deoxygenated blood? Explain how you know. How are nutrients transported around the body? Describe in 2 ways how excercise can have a positive impact on your body’s function.  Describe how diet can have a: a)positive impact b)negative impact |