Science Year 5

Knowledge and Skills:	Test Question, Apparatus Prediction, Method, Fair test (control variables), Results, Conclusion, Reliability. **Scientific Enquiry** By end of key-stage children should be able to:	Examples Ideas for prompting scientific enquiry:
Know and recall accurately key facts relevant to the science topics below. **Living Things and Their Habitats** • Describe the differences in the life cycles of a mammal, an amphibian, an insect, and a bird. Pupils could 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 behaviorists, for example, David Attenborough and Jane Goodall. Describe the life process of reproduction in some plants and animals including different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals.	ϒ Plan different types of scientific enquiries to answer questions and recognizing and controlling variables. ϒ Take precise and accurate measurements using scientific equipment. Take repeat readings where appropriate. ϒ Record data and results of increasing complexity using scientific diagrams and labels. Investigate 2 types of plant – one that uses sexual reproduction, and one that uses asexual reproduction. Sexual – Dissect a selection of flowers to locate sepal, petal, stamen, and carpel. Put onto sticky back plastic and label. Asexual – Produce a clone by taking a cutting of a strawberry plant or spider plant. ϒ Use classification keys, tables, scatter graphs, bar, and line graphs to record. ϒ Use test results to make predictions to set up further comparative and fair tests. ϒ Report and present findings drawing conclusions, causal relationships, explanations of and degree of trust. ϒ Identify scientific evidence that has been used to support or refute ideas or arguments.	Visit the locality to observe animals and life cycles in natural habitat. Observe changes in an animal over a period (for example, by hatching and rearing chicks). Insect Lore website – order Stick insect kits or Silkworm rearing kit to observe life cycle. Show pictures of Dolly the sheep, identical twins, Star Wars clones,daffodils, potatoes etc. Compare how other animals reproduce and grow –Zoos2school. Observe and compare the life cycles of plants and animals in the 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. Try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs.

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Animals including Humans. Describe the changes as humans develop to old age. Pupils could draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty.	ϒ Plan different types of scientific enquiries to answer questions and recognizing and controlling variables. ϒ Take precise and accurate measurements using scientific equipment. Take repeat readings where appropriate. ϒ Record data and results of increasing complexity using scientific diagrams and labels. ϒ Use classification keys, tables, scatter graphs, bar, and line graphs to record. ϒ Use test results to make predictions to set up further comparative and fair tests. ϒ Report and present findings drawing conclusions, causal relationships, explanations of and degree of trust. ϒ Identify scientific evidence that has been used to support or refute ideas or arguments. Research and compare gestation periods of various animals looking for patterns e.g. many/few offspring, life expectancy, size of animal (STEM website). Use the information to make predictions regarding animals they have not yet researched. Produce graphs.	School nurse visit. Create a Venn diagram male/female/both to recognize both physical and emotional changes during adolescence. Bring in any ultra-sound scan pictures the children themselves may have. Red book (Health visitor) for measurements and milestones. Compare head circumference then and now taking accurate measurements using cm and mm. Foetus fruit and veg sizes by week. – poppy seed to pumpkin (Hamilton trust – Foetal development detectives) Interview a pregnant lady to discuss growth and development so far. Visit from a baby. What can a new-born baby do on its own? Compare with other animals e.g. a giraffe calf that can work more or less straight after birth. Zoo visit and workshop. Invite great –grandparents/great grandparents in to hot-seat/ discuss changes getting older. Memory games e.g. generation game conveyor belt comparing old and young memory retention. Work out mean/produce scatter graph with key.

Year 5

Knowledge and Skills:

Know and recall accurately key facts relevant to the science topics below.

Properties and Changes of Materials

- Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. Some conductors will produce a brighter bulb than others.
- 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 gasesto decide how mixtures might be separated, including through filtering, sieving, and evaporating.
- Give reasons, based on evidence from comparative and fair tests, for the 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, rusting and the action of acid on bicarbonate of soda.

Children could 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.

Test Question, Apparatus Prediction, Method, Fair test (control variables), Results, Conclusion, Reliability.

Scientific Enquiry

By end of key-stage children should be able to:

- Plan different types of scientific enquiries to answer questions and recognizing and controlling variables.
- Take precise and accurate measurements using scientific equipment. Take repeat readings where appropriate.
- Record data and results of increasing complexity using scientific diagrams and labels.
- Use classification keys, tables, scatter graphs, bar, and line graphs to record.
- Use test results to make predictions to set up further comparative and fair tests.
- Report and present findings drawing conclusions, causal relationships, explanations of and degree of trust.
- Identify scientific evidence that has been used to support or refute ideas or arguments.

Investigation – which material works best as a thermal insulator to keep a drink hot at an outdoor winter event? Selection of cups- plastic, metal, ceramic, polystyrene, glass (will be difficult to control exact size but can use as a discussion point). Use a thermometer to record temp e.g. °c each minute. Repeat readings to increase validity.

Investigation – Soluble or insoluble? Range of materials to test dissolving e.g. sand, chalk, corn flour, rice, salt, sugar, instant coffee, gravy. Further questions that may be investigated -does temp affect rate of dissolving? Particle size? Number of times stirred? etc.

Investigate different ways of separating materials.
Mixtures to separate:
Salty water.
Flour, rice, and pastaFilter coffee in water
Iron & brass paper clips - use Sieves ¬ Filters ¬ Magnets ¬ Hairdryer/candles ¬ Water

Examples

Ideas for prompting scientific enquiry:

Observe irreversible reactions e.g. bikes with rust, vinegar, and bicarbonate of soda, burning materials e.g. candle with tile held over so that carbon can be observed., baking cakes. Mento in a coca cola bottle.

Provide children with several demonstrations as a discussion point regarding reversible and irreversible change e.g. melting ice-cube, frying an egg, melting wax, melted butter, cake mixture, burning paper, melted chocolate, dissolving salt into water.

Observe areas of school that have been gritted in winter? Observation – in class compare how long it takes for an ice cube to melt with/without salt in 2 identical containers.

Observe a selection of everyday items and their suitability e.g. pan – metal conducts heat to warm food up, plastic handle to insulate heat to prevent burning hand.

Sugar paper paintings with water to recap evaporation. Discuss hanging clothes out to dry etc.

Make recycled paper.

Create own lava lamps (link to dissolving and insolubility).

BBC science clips

WaterAid – safe drinking water – link tobacteria and filtering.

Make jelly. Jelly cube dissolving investigation – different temperatures, different flavours, different brands.

Quicksand experiment using corn flour (YouTube).
Bear Grylls – quick-sand episode.

Grow crystals.

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Earth and Space • Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. 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). • Describe the movement of the Moon relative to the Earth. 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). • Describe the Sun, Earth, andMoon 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. • Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses	ϒ Plan different types of scientific enquiries to answer questions and recognizing and controlling variables. ϒ Take precise and accurate measurements using scientific equipment. Take repeat readings where appropriate. ϒ Record data and results of increasing complexity using scientific diagrams and labels. ϒ Use classification keys, tables, scatter graphs, bar, and line graphs to record. ϒ Use test results to make predictions to set up further comparative and fair tests. ϒ Report and present findings drawing conclusions, causal relationships, explanations of and degree of trust. ϒ Identify scientific evidence that has been used to support or refute ideas or arguments. Compare the time of day at different places on the Earth through internet links and direct communication. Use globes and torches to predict night and day in different countries. Creating simple models of the solar system Construct simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day.	Visit to observatory at York University. Look at satellite images taken from space. Create constellations using toilet rolls, black paper, and needles. Create scale of planets (size and distance apart) on field. Learn about Tim Peake, or the first moon landing. Create a moon diary. Sketch the position of the sun at diff points in the day. Science and Technology Facilities council loan out moon rock brought back in the 60s and 70s. (Need to reserve at least 4 months in advance). Astronaut training – become astronauts for the day. Make rockets/rocket mice-stem website. Rotating model of solar system (from science resources). 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. UFO theories. Find out why some people think that structures such as Stonehenge might have been used as astronomical clocks.

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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. • Recognize that some mechanisms, including levers, pulleys, and gears, allow a smaller force to have a greater effect.	ϒ Plan different types of scientific enquiries to answer questions and recognizing and controlling variables. ϒ Take precise and accurate measurements using scientific equipment. Take repeat readings where appropriate. Measure force of different objects using a force meter/newton meter. ϒ Record data and results of increasing complexity using scientific diagrams and labels. ϒ Use classification keys, tables, scatter graphs, bar, and line graphsto record. ϒ Use test results to make predictions to set up further comparative and fair tests. ϒ Report and present findings drawing conclusions, causal relationships, explanations of and degree of trust. ϒ Identify scientific evidence that has been used to support or refute ideas or arguments. Investigation – air resistance. Design a parachute for a minion. Possible variables – size, shape, material OR make spinners testing different lengths or widths. Time using stop watches. Repeat readings where appropriate. Children produce annotated diagrams explaining how levers, pulleys, gears etc.work e.g. demonstrate crowbar, wheelbarrow, bottle opener, pliers, tweezers, rowing boat. Investigation – testing effect ground friction has on movement. You might use a ramp to test this using a variety of materials e.g. sandpaper, carpet, silk., measuring how far an item e.g. ball travels. If using a flat surface measure force using newton meter. Repeat for validity.	Explore falling objects and raise questions about the effects of air resistance e.g. by observing how different objects such as parachutes and sycamore re seeds fall. 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. Explore resistance in water by making and testing boats of different shapes. Design and make products that use levers, pulleys, gears and/or springs and explore their effects. Find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation. Run across playground. Then repeat holding a large sheet of card in front. Talk about how athletes use knowledge or water resistance/air resistance to gain valuable seconds e.g. shaving legs, clothing. Rolls Royce have produced investigations on stem website for this topic. Explore resistance in water by making and testing boats of different shapes. Observe forces around the classroom – e.g. book on bookshelf. If bookshelf removed what would happen? Create tabletop see-saws (park visit to observe forces and mechanisms). Take the class swimming to demonstrate water resistance. Ask children to run in the water.