Science Year 6

Knowledge and Skills:	Test Question, Apparatus Prediction, Method, Fair test (control variables), Results, Conclusion, Reliability. **Scientific Enquiry**	Examples
Know and recall accurately key facts relevant to the science topics below.	Children should be able to:	Ideas for prompting scientific enquiry:
Living Things and Their Habitats • Describe how living things are classified into broad groups according to common observable characteristics, and based on similarities and differences, including micro-organisms, plants, and animals. Look at the classification system in more detail. Broad groupings, such as micro-organisms, plants and animals can be subdivided. • Give reasons for classifying plants and animals based on specific characteristics. Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification. Kingdom, Phylum, Class, Order, Family Genus, Species,	☐ 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. Observation: use classification systems and keys to identify some animals and plants in the immediate environment or on a local walk. Observe, research, and record thefeatures of a range of leaves found in their local environment. Identify native and non-native. Take cameras, sketch pads, magnifying glasses.	Zoos2schools, Rivers Trust invertebrate classifying activity. Through direct observations where possible, pupils should classify animals into commonly found invertebrates (such as insects,spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds, and mammals). Arachnids, molluscs, annelids, crustacean, gastropod. Invertebrate hunt in locality using magnifying glasses, pooters etc. Produce bar/line /pie charts showing numbers found. Seasonal walk to identify local Flora and Fauna. Leaf/tree sketches and prints/rubbings Visit to RHS Harlow Carr. Research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system (link to recently discovered animals or weird and wonderful creatures for awe and wonder). Produce a classification key for sweets. Could use main ingredient, structure (layered, encased in a shell), texture, shape, size, colour. Create a branching diagram. Big garden bird watch – RSPB (packs available). Organise data into different types of diagrams e.g. Carroll. Create botanical drawings – National history museum botanical drawings website. Use a flower press and create an annotated diagram of a local flower, including classification information. Dissect flowers and draw the parts separately. British trees – woodlandtrust.org.uk Outdoor elements provide workshops on trees. Design and create a 'new' animal and explain how it would fit into the classification system.

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Animals including Humans. • Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. • Recognize the impact of diet, exercise, drugs, and lifestyle on the way their bodies. function. Some substances can be harmful and can damage the body – look at scientific research to support. • Describe the ways in which nutrients and water are transported within animals, including humans (diffusion and osmosis) Build on prior knowledge – skeletal, muscular, and digestivesystem (Y3 and 4)	☐ Plan different types of scientific enquiries to answer questions, and recognizing andcontrolling variables. ☐ Take precise and accurate measurements using scientific equipment. Take repeat readings where appropriate. Measure heart-rate bpm. ☐ 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: - Heart rate and the effect of different kinds of exercise. Could measure increase in heart rate/recovery rate. Design a fair test, identify causal relationships, Take repeat readings where appropriate. Investigation: relationship between age in humans and heart rate. Design an investigation using sample from school or wider community e.g. nursery child, y6, adult, elderly. Investigate link between animal size and heart rate (vet visit). http://www.schoolingamonkey.com/osmosis-for-kids-blood-cell/ http://kitchenpantryscientist.com/diffusion-and-osmosis-experiments/ - Investigation: Use jellied worms and skittles to explain the difference between diffusion and osmosis (See Hamilton trust –Nutrient detective).	Heart dissection. Images of healthy/smoker's heart to compare. Make blood using food colouring, salt, mini-marshmallows, cheerios, mini-pom poms. See rising stars website. Create a painting of blood as seen under a powerful microscope. Anatomical figure on display from science resources. Create clay sculpture of heart. Produce diagrams of circulatory system –You tube videos to show it in action. Drama/role-play blood moving around the circulatory system. Children acting as the various parts. e.g. blood, lungs, heart. Create an advert for keeping bodies healthy- diet, other life-style choices, exercise. Link to research. Create food diary for week. Compare with NHS guidance. Make healthy snacks. Look at processed foods ingredients including additives and chemicals. Hidden salt and sugar content. Create a sugar display showing how many sugar cubes are in different foods and drinks.

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Evolution and Inheritance • Recognize that living things havechanged over time and that fossils provide information about living things that inhabited the Earth millions of years ago. • Recognize that living things produce offspring of the same kind, but normally offspring. vary and are not identical to their parents. For instance, by considering different breeds of dogs, and what happens when, for example, Labradors are crossed with poodles. • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. Variation in offspring over time can make animals more/less able to survive environments, for example, byexploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox. At this stage, pupils are not expected to understand how genes and chromosomes work.	☐ 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 – predict which 'beak' is best for each food type? Selection of 'food types' – bird seed, rice, raisin, playdough, pipe cleaner. For beaks: chopsticks, spoons, tweezers, clothes peg, small flat stones. See stem.org.uk	Find out about the work of paleontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution. Observe and raise questions about local animals and how they are adapted to their environment. Comparing how some living things are adapted to survive in extreme conditions, for example, cactuses, penguins, and camels. Analyse the advantages and disadvantages of specific adaptations, such as being on two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers. Look at a selection of fossils under a magnifying glass. Sketch and annotate. (Fossils as evidence of evolution). Grow cacti. Survival role-play. Bear-Grylls. Look at what characteristics the children have inherited from their parents (depending on whether appropriate for that class). Familytree. Give children images of various animals and ask to predict which environment they live in according to adaptations. Sickle cell – adaptation acts as a preventative measure for malaria. Create clay fossils (those found further down likely to have died earlier). outstandingscience.co.uk Create sample environments in trays so that pupils can see first-hand how plants/animals will have needed to adapt e.g. arctic, desert. Walk along a beach. Discuss adaptations for animals' feet etc.

Y6

Knowledge and Skills:

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

Light

- Recognize that light appearsto travel in straight lines.
- Use the idea that light travels in straight lines to explain that objects are seen. because they give out or reflect light into the eye.
- Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.
- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

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

Scientific Enquiry

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: Light travels in a straight line. Use torches and ask children whether they can bend a light beam. Can they change the direction of a light beam?

Investigate: Does light come from our eyes or from an original light source, reflecting off objects into our eyes? Predict. Use torch, shoe box with an eye hole and a 'light' hole covered by a flap, object to go in the box). Use scientific evidence to support/refute. Produce a scientific drawing of investigation.

Investigate: light travels in straight lines. 3 holes in 3 pieces of card. Investigate whether the light can travel through when the holes are /are not lined up.

Investigation: Children to design an investigation to test if different materials block light to create a shadow. Do resulting shadows differ depending on material used? Use transparent, translucent, and opaque materials.

Examples

Ideas for prompting scientific enquiry:

Discuss use of mirrors e.g. on cars.
Mirror art.

Design and make a periscope and using the idea that light appears to travel in straight lines to explain how it works.
Make a camera obscurer.

Optician visit.

Make our own spectroscopes and colour wheel to study the properties of light.

Investigate the relationship between light sources, objects, and shadows by using shadowpuppetes. What causes a shadow to become larger/smaller and more or less defined?

Extend their experience of light by looking at a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur)

Demonstrate word changing behind a glass when distorted by water.

Describe through a diagram why the moon appears to be a source of light, but is not.

Pose the question – If our eyes are not light sources, j` can we often still see at night time?

Shine a torch (white light) at a prism to see the colours separate.

Clips from movies e.g. Mission impossible – alarm triggered by lasers (shows light travelling in straight lines).

Sketch the eye in fine detail using images from microscopes.

Blow bubbles to investigate light and colour.

Observe refraction e.g. a straw in a glass, arm in a fish tank.

Use a piece of paper and a glass of water on a windowsill. Ensure light is shining directly on glass. Move glass around until a rainbow appears.

Make a rainbow spinner When spun it should turn white. (See Hamilton trust for further guidance).

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Electricity • Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. • Use recognized symbols when representing a simple circuitin a diagram. Pupils are expected to learn only about series circuits, not parallel circuits. Pupils should be taught to take the necessary precautions for working safely with electricity.	☐ 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: systematically identify the effect of changing one component at a time in a circuit. Investigation: Investigate the relationship between circuit components (buzzers, motors or bulbs) & the use of batteries or cells (both the number & voltage). Report and present findings.	Design and make a set of traffic lights, a burglar alarm, or some other useful circuit. Make different types of switches e.g. push, slide Test a range of materials to see if they conduct electricity for your switch e.g. pencil, cork, coin, salt, tin foil, mirror. (Y4 revision). Observe items that use electrical motors e.g. hand fan. Make an electric powered car for DT. Explore different electrical items and link to circuits e.g. fairy lights. Create a dimmer switch. Look at variety of circuit diagrams with errors. Build circuits and explain why the circuit does not work. Draw a circuit for your partner to build. Can they recognize the symbols to build it correctly? Tricks using static electricity. You tube (awe and wonder). Turn motors into dancers. Simple circuit on a pizza box using paper clips and pins. Play games that use electricity e.g. operation.