

Progression of skills and vocabulary across the curriculum at Tollgate: Science

Summary of Y3/4 Working scientifically Key Skills: Ask relevant questions. Set up simple enquiries and tests. Make observations and take measurements. Use data to help answer questions. Record and report findings. Use results to draw conclusions. Compare ideas and processes. Use evidence to question and support own findings.

Summary of Y5/6 Working scientifically Key Skills: Plan enquiries to answer questions. Take measurements. Record results using scientific diagrams. Use results to make predictions to set up further enquiries. Report findings from enquiries. Identify and explain the variables you will control in an investigation. Choose the most appropriate method to present your data.

Year 3	Year 4	Year 5	Year 6
Plants	Living Things & their habitats	Living Things	Living Things
<p><u>Key Skills and inquiry questions</u> setting up simple practical enquiries, comparative and fair tests</p> <p>reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p> <p>Which conditions grow the healthiest plants? Explain.</p> <p>How could you design a fair test to show this?</p> <p>What is the most important part of a plant and why?</p>	<p><u>Key Skills and inquiry questions</u> Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</p> <p>Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</p> <p>Using straightforward scientific evidence to answer questions or to support their findings</p> <p>Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p> <p>How can we classify different animals?</p> <p>How are animals suited to where they live?</p>	<p><u>Key Skills and inquiry questions</u> planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</p> <p>recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</p> <p>reporting and presenting findings from enquiries in oral and written forms such as displays and other presentations</p> <p>How do the life cycles of living creatures differ?</p> <p>How do plants ensure their own survival? (Flowering and non-flowering/pollination)</p> <p>How can you create your own inquiry to study the success of a</p>	<p><u>Key Skills and inquiry questions</u> Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.</p> <p>Reporting and presenting 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.</p> <p>What characteristics need to be considered when classifying leaves?</p> <p>What environmental conditions support the growth of fungi?</p>

				seed travelling as far as possible from its parent plant?			
<u>Previous Vocab</u> Yr2 Living/dead/ never been alive Micro-habitat, Food chain Food source, Mature (plant), Water/light/ temperature, growth, healthy, survival, cold/warm/ warmth germination reproduction Roots, leaves, stem, flower, leaves	<u>Key New Vocab</u> Pollination Fertilisation Transpiration Nutrients findings systematic scatter graph	<u>Previous Vocab</u> Food chain Habitat Vertebrate Invertebrate Classify <u>Term 4 Year 4</u> Producer Consumer Predator Prey Findings Conclusion (T1Y4)	<u>Key New Vocab</u> Identify Recognise Classification Categories Non/flowering plant Amphibian Reptile Mammal Vertebrate Invertebrate	<u>Previous Vocab</u> Reproduction Germination Mammal Amphibian Pollination Fertilisation Findings Conclusion <u>Term 1 Year 5</u> Variable Fair test Control Repeat Reliability	<u>Key New Vocab</u> Life process Reproduce Offspring Seed dispersal Sexual/asexual Metamorphosis	<u>Previous Vocab</u> Mammal Reptile Amphibian Vertebrate Invertebrate Variable Fair test Control Findings Conclusion Repeat Reliability	<u>Key New Vocab</u> Toothed Untoothed Lobed Unlobed Compound leaves Simple leaves Classification Annelid Mollusc organism Micro-organism Characteristics
Light		Sound		Earth and Space		Light	
<u>Key Skills and inquiry questions</u> Setting up simple practical enquiries, comparative and fair tests Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions How can we change the size of a shadow?		<u>Key Skills and inquiry questions</u> Using straightforward scientific evidence to answer questions or to support their findings Setting up simple practical enquiries, comparative and fair tests Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including data loggers		<u>Key Skills and inquiry questions</u> reporting and presenting 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 identifying scientific evidence that has been used to support or refute ideas or arguments planning different types of scientific enquiries to answer questions,		<u>Key Skills and inquiry questions</u> 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. Using test results to make predictions to set up further comparative and fair tests.	

		<p>Recording findings using simple scientific language, drawings, labelled diagrams and tables</p> <p>Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p> <p>Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</p> <p>What happens to the sound of a drum when we get further away from it?</p> <p>How are sounds made?</p> <p>What can sound travel through?</p> <p>How can sound be changed?</p>		<p>including recognising and controlling variables where necessary</p> <p>How can you show your understanding of the Solar System?</p> <p>How can we prove the shape of Earth, Sun and Moon?</p> <p>Why does the shape of the moon appear to change over time?</p> <p>How does the effect of the Sun explain everyday events that occur on planet Earth?</p> <p>How can you create your own inquiry to test balloon rockets further?</p>		<p>Reporting and presenting 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.</p> <p>Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.</p> <p>How does light travel?</p> <p>How can you change the shape of a shadow?</p> <p>How can we increase the number of reflections?</p>	
<u>Previous Vocab</u>	<u>Key New Vocab</u>	<u>Previous Vocab</u>	<u>Key New Vocab</u>	<u>Previous Vocab</u>	<u>Key New Vocab</u>	<u>Previous Vocab</u>	<u>Key New Vocab</u>
Reflection Shadow Blocked Findings (T1 Y3)	Light source Opaque Transparent Translucent Compare	Systematic Findings Conclusion (T1Y4)	Vibration Medium Pitch Fainter Associate	Seasons (Y1) The Sun (Y1) Compare Trust Findings Conclusion	Orbit Celestial body Solar system Spherical body Rotation Relative to Support	Light source Reflection Shadow Blocked Opaque Transparent Translucent Findings Conclusion	Formation Pupil Iris Optic Nerve Cause Refute Vary

Forces & Magnets	Electricity	Forces	Electricity
<p><u>Key Skills and inquiry questions</u> Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</p> <p>How does the surface of a ramp affect how far a car travels? How can magnets help separate some materials?</p>	<p><u>Key Skills and inquiry questions</u> Asking relevant questions and using different types of scientific enquiries to answer them Setting up simple practical enquiries.</p> <p>Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</p> <p>Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p> <p>Using results to draw simple conclusions.</p> <p>What can electricity do? Which circuits will work? Which materials are insulators and conductors?</p>	<p><u>Key Skills and inquiry questions</u> planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</p> <p>taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate</p> <p>recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs using test results to make predictions to set up further comparative and fair tests</p> <p>reporting and presenting 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</p> <p>What affects how well an object moves through air, water or on different surfaces (including when propelled)? How do pulleys, levers and gears work?</p>	<p><u>Key Skills and inquiry questions</u> Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p> <p>Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.</p> <p>Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. Using test results to make predictions to set up further comparative and fair tests.</p> <p>Reporting and presenting 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.</p> <p>How does the number and voltage of the cells in a simple circuit affect the brightness of bulbs, the loudness of buzzers or the speed of motors?</p>

<u>Previous Vocab</u>	<u>Key New Vocab</u>	<u>Previous Vocab</u>	<u>Key New Vocab</u>	<u>Previous Vocab</u>	<u>Key New Vocab</u>	<u>Previous Vocab</u>	<u>Key New Vocab</u>
Metal Push pull <u>Term 1 Year 3</u> Findings Systematic	Magnetic Non-Magnetic Attract Repel Resistance Friction Classify Properties	Metal Systematic Classify	Electricity Series circuit Component Cells, wires, bulbs, switches, buzzer, motor Conductor Insulator Construct Investigate	Findings Conclusion <u>Term 1 Year 5</u> Variable Fair test Control Repeat Reliability	Gravity Air resistance Water resistance Friction Lever/pulley/ gear Forcemeter Precision Comparative	Series circuit Cells Conductor Insulator Measurement Fair test Prediction Findings Conclusion Comparative	Voltage Variation Components Parallel
Animals including Humans		Animals including Humans		Animals including Humans		Animals including Humans	
<u>Key Skills and inquiry questions</u> Using straightforward scientific evidence to answer questions or to support their findings Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables. Why do animals need to eat a range of foods to be healthy? Which is most important: skeleton or muscles?		<u>Key Skills and inquiry questions</u> Recording findings using simple scientific language, drawings, labelled diagrams and tables Using straightforward scientific evidence to answer questions or to support their findings What are the functions of different types of teeth? What happens when we chew and digest food? What is a food chain?		<u>Key Skills and inquiry questions</u> Identifying scientific evidence that has been used to support or refute ideas or arguments Recording data and results using scientific diagrams and labels, tables, bar and line graphs Reporting and presenting 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 Is there a relationship between the mass of an adult animal and the length of the gestation period?		<u>Key Skills and inquiry questions</u> 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, classification keys, 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	

				What happens to humans as they become older?		conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.	
						Does changing the type of exercise you do, have an impact on your pulse rate?	
<u>Previous Vocab</u> Carnivore (Y1) Herbivore (Y1) Omnivore (Y1) Food chain (Y1) <u>Yr 2</u> Offspring, adult, Basic needs, Exercise, hygiene	<u>Key New Vocab</u> Nutrition Contract/Relax Vertebrates Invertebrates Findings Systematic Scatter graph	<u>Previous Vocab</u> Food Chain Carnivore Herbivore Findings	<u>Key New Vocab</u> Digestive system oesophagus/ stomach/small & large intestine Producer Consumer Predator Prey Function	<u>Previous Vocab</u> Growth Life cycle Compare Comparative (T4Y5) Findings Conclusion	<u>Key New Vocab</u> Puberty Gestation period Pituitary Gland Hormones Immune System	<u>Previous Vocab</u> Contract/relax Nutrition Trust Compare Comparison Comparative Precision Findings Conclusion Reliability	<u>Key New Vocab</u> Blood vessels Circulation Artery Nutrients Pulmonary Air sac (alveoli) Capillary
Rocks		States of Matter		Properties & Changes of Materials		Evolution	
<u>Key Skills and inquiry questions</u> asking relevant questions and using different types of scientific enquiries to answer them recording findings using simple scientific language, drawings, labelled diagrams identifying differences, similarities or changes related to simple scientific ideas and processes What are fossils and how did they get where they are?		<u>Key Skills and inquiry questions</u> Asking relevant questions and using different types of scientific enquiries to answer them Recording findings using simple scientific language, drawings, labelled diagrams Making systematic and careful observations and take accurate measurements		<u>Key Skills and inquiry questions</u> 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		<u>Key Skills and inquiry questions</u> Reporting and presenting 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. Identifying scientific evidence that has been used to support or refute ideas or arguments.	

How are rocks different from one another?		How do solids, liquids and gases behave when different conditions are placed upon them? What is the water cycle?		<p>recording data and results of increasing complexity using scientific diagrams and labels</p> <p>reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms</p> <p><u>Part 1</u></p> <p>What affects how well something dissolves?</p> <p>How can mixtures and solutions be separated?</p> <p>Can all things mixed together be separated?</p> <p>Which changes cannot be reversed?</p> <p><u>Part 2</u></p> <p>Which is the best material to keep something: Warm? Cold?</p> <p>How is knowledge of conductivity and insulation helpful in real life?</p>		<p>Genetic Modification: Should humans intervene in this way? Why? Why not?</p> <p>How did Darwin's scientific findings influence people's views about evolution?</p>	
<u>Previous Vocab</u>	<u>Key New Vocab</u>	<u>Previous Vocab</u>	<u>Key New Vocab</u>	<u>Previous Vocab</u>	<u>Key New Vocab</u>	<u>Previous Vocab</u>	<u>Key New Vocab</u>
Yr1 Material, Absorbent Opaque Transparent	Fossil Sedimentary Igneous Metamorphic	Compare Group Temperature (Y2)	Solid Liquid Gas Particle Freezing point Boiling point Degrees Celsius Thermometer Evaporation (evaporate) Condensation Water cycle	Compare Group Properties Material Electrical conductivity Solid/liquid/gas Change of state Heating/cooling /Melting Freezing point Boiling point	Soluble Thermal conductivity Substance Dissolve Solution Saturated Mixture Filter Reversible Irreversible Burning/rusting	Mammals Offspring Trust Support Findings Conclusion <u>Term 2 Year 6</u> Refute Vary	Selective Breeding Theory of evolution Adaptive traits Evolution Adaptation Genes
Yr2 Suitable Unsuitable, Properties of material Classify (T3 Y3)	Group Sort						

Compare (T4 Y3) Findings (T1 Y3)			Prediction Observation Conclusion Trust	Degrees Celsius Thermometer Evaporation (evaporate) Condensation Water cycle Trust Conclusion	Condense Variable Fair test Control Repeat Reliability		
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SEND/ Vulnerable groups

Children with special needs are encouraged and supported when necessary, to allow them full access to the curriculum. Many of the activities provided in science lessons allow for differentiation through outcome, mixed ability groupings and by the amount of adult support given to individuals or groups of children. Whenever possible or appropriate, visual resources are used to support learning and children with SEND may be given opportunities to record in alternative ways, for example mind maps, pictorially or with the use of IT. In some circumstances, vocabulary may be pre-taught and key vocabulary supported during lessons using word mats/bilingual word mats.

Progression of key knowledge at Tollgate: Science

Year 3	Year 4	Year 5	Year 6
Plants	Living Things & their habitats	Living Things & their habitats	Living Things
Flowering plants have roots, stem/trunk, leaves and flowers. Plants need air, light, water, nutrients and room to grow. Flowering plants are pollinated, from seeds and are dispersed to continue the life cycle.	Living things can be grouped in a variety of ways using classification keys Environments can change and this can sometimes pose dangers to living things <u>Suggested people study:</u> Carl Linnaeus	Most animals including fish, mammals, reptiles and birds have simple life cycles of 3 stages: before birth, young and adult. The young are typically similar to their parents, just smaller. Animals like frogs and newts undergo a metamorphosis as part of their life cycle. They are born, spend their early life underwater, breathing with gills, grow into adults and move to land, breathing with lungs. Insects undergo either an incomplete or complete metamorphosis. <u>Suggested people study:</u> David Attenborough Jane Goodall	<u>Classification</u> means to group things according to the characteristics or features they have in common. Living and non-living things can be classified in more than one way. <i>Verb: to classify</i> The six <i>main</i> animal classification groups are: mammals, reptiles, amphibians, fish, birds and insects.
Light	Sound	Earth and Space	Light
Light from the sun can be dangerous and there are ways to protect the eyes.	Vibrations create sound and these travel in waves to the ear. The pitch and loudness of sound can be changed.	The Sun is at the centre of the Solar System and planets follow individual paths called orbits to travel around it. They travel in the same direction but at different speeds. A moon is a celestial body that orbits a planet.	Light travels in straight lines. Shadows take the shape of the object blocking the light, shadow form and size can be changed by moving the light source.

Shadows are formed when the light from a light source is blocked by an opaque object.	<u>Suggested people study</u> Robert Boyle Ernst Mach Heinrich Hertz	The Sun appears to rise and fall on Earth but the rotation and orbit of Earth is how we have day and night and seasons of the year. <u>Suggested people study</u> Ptolemy Alhazen Copernicus Professor Brian Cox Helen Sharman & Tim Peake	
Forces & Magnets	Electricity	Forces	Electricity
Magnets have 2 poles and they will attract or repel each other, depending on which poles are facing. Magnets attract some materials and not others.	Electricity is a type of energy and is used for different purposes. In order for an electrical circuit to work it has to be complete. Some materials are conductors of electricity while others are insulators. <u>Suggested people study</u> Benjamin Franklin Charles Augustine Coulomb Alessandro Volta Andre-Marie Ampere	Forces can: stretch, tear, squash, bend, turn or spin, twist, move, stop and speed up the movement of an object. Direction of force is shown by arrows. A Newton or forcemeter is used to measure the amount of force. Gravity is a pull towards the centre of an object such as Earth. Objects with big masses have larger gravitational forces. Weight is the pull of Earth's gravity on the mass of an object. An increase in mass does not affect how fast an object will fall to Earth. Friction is the force produced from two surfaces rubbing together. In air this is called air resistance. Upthrust in water is the force pushing up against an object. <u>Suggested people study</u> Galileo Galilei Isaac Newton	Complex circuits can be simplified using symbols in circuit diagrams. A component's function will vary depending on the voltage of cells used in the circuit.
Animals including Humans	Animals including Humans	Animals including Humans	Animals including Humans
Animals and humans need different nutrients from their food. Skeletons and muscles provide support, protection and movement.	The human digestive system is responsible for getting food in and out of the body. Human teeth have different names and functions. A food chain consists of producers, consumers, predators and prey. <u>Suggested people study:</u> Al-Jahiz Charles Elton	Gestation is the time taken for a foetus to develop, beginning with fertilisation and ending in birth. The duration of gestation varies between species. Puberty is a period of change in the human body. When a child's body is ready to begin puberty, their pituitary gland (at the bottom of the brain) releases special hormones. As you get older, your skin becomes drier, thinner and less elastic. Your bones become more visible as you store less fat beneath your skin and bones and muscles become weaker. Your memory may get worse and your immune system is less able to fight disease.	The components of the circulatory system are: the heart, the lungs and blood vessels (arteries, veins and capillaries). Nutrients and water are absorbed in the system in the stomach, small and large intestines. The blood is circulated throughout the body (including being oxygenated in the lungs and the heart). Exercise, diet and lifestyle impact the way our bodies function.

		<u>Suggested people study:</u> Professor Robert Winston	
Rocks	States of Matter	Properties & Changes of Materials	Evolution
<p>Soils are made from rocks and organic matter.</p> <p>There are three different types of rock: igneous, sedimentary and metamorphic.</p> <p>Fossils are formed when things that have lived are trapped within rock.</p>	<p>Evaporation and condensation are features within the water cycle. Temperature affects the rate of evaporation.</p> <p>Materials are either in a state of solid, liquid or gas.</p> <p>Some materials change state when they are heated or cooled.</p> <p><u>Suggested people study</u> Alfred Barnhard Nobel</p>	<p>Thermal conductivity is the ability to transfer heat from one object to another.</p> <p>Some materials do not transfer heat easily, but slow it down, these are poor thermal conductors but good thermal insulators.</p> <p>All metals can conduct electricity. Electrical insulators do not conduct electricity.</p> <p>Heating and cooling materials can bring about changes in state. If the change is just physical then it can be reversed. If a change is chemical, it is likely to be permanent.</p> <p>A mixture is formed when 2 or more materials have been physically mixed but not chemically. They can be separated eg. By sieving, filtering, evaporation.</p> <p>When materials dissolve they form a solution.</p> <p>A chemical change is a change where new materials are formed.</p> <p><u>Suggested people study</u> Spencer Silver Ruth Benerito Marie Curie</p>	<p>Inherited traits are characteristics which are passed on from parent to offspring.</p> <p>Adaptation are characteristics which are influenced by the environment.</p> <p>Living things adapt to suit their environment. We call adaptations which occur over time, evolution.</p>