

Term and unit name	Learning Question	Corresponding Success Criteria.
Term 1 Energy: Light and shadows (A) / Light and Reflection Year 6	Lesson 1: The pathway of light. Knowledge Can I describe the pathway of light? Working scientifically Can I use evidence to form conclusions?	Knowledge 1) I can compare sources of light. 2) I can describe how light travels. Working scientifically 1) I can make observations about the properties of light. 2) I can use my observations as evidence to support conclusions about light.
	Lesson 2: See the light. Knowledge Can I describe how we see? Working scientifically Can I draw scientific diagrams?	Knowledge 1) I can describe how we see luminous objects. 2) I can describe how we see non-luminous objects. 3) I can explain how the eye is protected from light. Working scientifically 1) I can draw ray diagrams.
	Lesson 3: Measuring shadows Knowledge Can I explain how shadows change? Working scientifically Can I pose questions?	Knowledge 1) I can recall factors that affect the size of a shadow. 2) I can describe how the distance between an object and the surface its shadow is cast on affects the size of the shadow. 3) I can use ray diagrams to explain why shadows change size. 4) I can use ray diagrams to explain why the shape of a shadow matches the object that cast it. Working scientifically 1) I can pose testable questions in response to observations.
	Lesson 4: Reflecting Light Knowledge Can I investigate what affects the angle of the reflected ray?	Knowledge 1) I can recall what happens to light when it reaches a smooth mirror surface. 2) I can identify the incoming and reflected rays.

	Working scientifically Can I record results as a line graph?	3) I can describe the relationship between the angles of the incoming and reflected rays. Working scientifically 1) I can record my measurements as a line graph. 2) I can use my line graph to extrapolate data and make predictions about missing values.
	Lesson 5: Making a periscope Knowledge Can I explain how a periscope works?	Knowledge 1) I can use mirrors to make a working periscope. 2) I can describe the journey light makes through a periscope. 3) I can use ray diagrams to explain how a periscope works.
	Lesson 6: Using Mirrors Knowledge Can I explain how mirrors are helpful? Science in action Can I explore different jobs or inventions that depend on reflection?	Knowledge 1) To recall a range of uses of mirrors and reflection. 2) To describe how a mirror is used to reflect light in different situations. 3) To explain how light is reflected using knowledge of light and reflection. Science in action 1) To recall various jobs or inventions that use mirrors and reflection.

Term and unit name	Learning Question	Corresponding Success Criteria.
Term 2 Living Things: Life Cycles and Reproduction (B) Year 5	Lesson 1: Life cycles and reproduction in plants. Knowledge: Can I describe the life cycle of a plant, including the reproductive stage? Working scientifically: Can I observe and compare equivalent parts in different flowers?	Knowledge: 1) I can describe the plant life cycle. 2) I can describe sexual reproduction in plants. Working scientifically: 1) I can dissect a flower. 2) I can observe the parts of a flower in detail using a magnifying glass. 3) I can compare equivalent parts in different flowers.
	Lesson 2: Life cycle of a mammal. Knowledge: Can I describe the life cycle of a mammal? Working scientifically: Can I research the life cycles of different mammals?	Knowledge: 1) I can describe the life cycle of a mammal. 2) I can compare the life cycles of different mammals. 3) I can describe sexual reproduction in mammals. Working scientifically: 1) I can research using a fact sheet. 2) I can identify relevant information.
	Lesson 3: Life cycle of a bird. Knowledge: Can I describe the life cycle of a bird and compare it with that of a mammal? Working scientifically: Can I pose questions to compare the life cycles of different birds?	Knowledge: 1) I can describe the life cycle of a bird. 2) I can compare the life cycles of different birds. 3) I can compare the life cycles of mammals and birds. Working scientifically: 1) I can pose relevant questions about the life cycle of a bird. 2) I can use technology to answer those questions. 3) I can assess the value of a question.
	Lesson 4: Life cycle of an amphibian. Knowledge:	Knowledge: 1) I can describe the life cycle of an amphibian. 2) I can compare the life cycles of different amphibians.

	Can I describe the life cycle of an amphibian? Working scientifically: Can I suggest how temperature may affect egg hatching?	Working scientifically: 1) I can analyse data. 2) I can use data to draw conclusions. 3) I can identify what further data is needed.
	Lesson 5: Life cycle of an insect. Knowledge: Can I describe the life cycle of an insect and compare it with that of an amphibia? Working scientifically: Can I use data to describe a relationship and make predictions?	Knowledge: 1) I can describe the three-stage life cycle of an insect. 2) I can describe the four-stage life cycle of an insect. 3) I can compare the life cycles of insects and amphibians. Working scientifically: 1) I can identify patterns in data. 2) I can use data to make predictions.
	Lesson 6: Asexual Reproduction in plants. Knowledge: Can I describe asexual reproduction in plants? Working scientifically: Can I represent root growth over time on a line graph?	Knowledge: 1) I can describe the changes to a cutting as it grows. 2) I can explain the difference between a clone and other offspring. Working scientifically: 1) I can plot data accurately on a line graph. 2) I can estimate missing data from a line graph. 3) I can extrapolate a line graph.

Term and unit name	Learning Question	Corresponding Success Criteria.
Term 3 Forces and space: Unbalanced forces (B) Year 5	Lesson 1: Gravity Knowledge Can I describe gravity and its effects? Working scientifically Can I analyse data to write a conclusion?	Knowledge 1) I can define the term gravity. 2) I can explain why unsupported objects fall towards the Earth. 3) I can describe the relationship between mass and gravity. Working scientifically 1) I can analyse data and identify anomalies. 2) I can compare data to a prediction. 3) I can describe the relationship between two variables.
	Lesson 2: Air Resistance Knowledge Can I describe air resistance and its effects? Working scientifically Can I plan a fair test to investigate air resistance?	Knowledge 1) I can define the term air resistance. 2) I can describe the relationship between surface area and air resistance. Working scientifically 1) I can identify variables. 2) I can write a method.
	Lesson 3: Water resistance Knowledge Can I describe water resistance and its effects? Working scientifically Can I design a results table?	Knowledge 1) can define the term water resistance. 2) I can describe the effects of water resistance. 3) I can describe the relationship between surface area and water resistance. Working scientifically 1) I can measure time accurately. 2) I can design a results table for repeat data. 3) I can calculate an average.

	Lesson 4: Friction Knowledge Can I describe friction and its effects? Working scientifically Can I evaluate a method?	Knowledge 1) I can define the term friction. 2) I can describe the effects of forces. 3) I can predict the outcomes of balanced and unbalanced forces. Working scientifically 1) I can evaluate the degree of trust. 2) I can identify steps that need improving. 3) I can suggest improvements.
	Lesson 5: Levers, Pulleys and Gears (part 1) Knowledge Can I describe the effects of levers, pulleys and simple machines on movement? Working scientifically Can I draw and label a diagram?	Knowledge 1) I can explain the purpose of levers and pulleys. 2) I can explain the purpose of gears. Working scientifically 1) I can draw a diagram of a wind-powered pulley. 2) I can label a diagram.
	Lesson 6: Levers, Pulleys and Gears (part 2) Knowledge Can I describe the relationship between lever length and effort? Working scientifically Can I draw an accurate line graph?	Knowledge 1) I can name the three things needed for a lever. 2) I can list the uses of levers. 3) I can explain how changing the length of a lever will affect the effort needed to lift the load. Working scientifically 1) I can label the axes on a line graph. 2) I can plot data on a line graph. 3) I can draw a line of best fit.

Term and unit name	Learning Question	Corresponding Success Criteria.
Term 4: Materials: Rocks and soil (Year 3/4 unit A)	Lesson 1: Rocks: Appearance Knowledge - To group rocks using their appearance. Working scientifically - To observe the appearance of rocks closely, using a magnifying glass.	Knowledge - I can define the term rock. - I can describe the appearance of different rocks. - I can identify crystals and grains. Working scientifically - I can use a magnifying glass correctly. - I can observe the appearance of a rock in detail.
	Lesson 2: Rocks: Physical properties Knowledge - To group rocks using their physical properties. Working scientifically - To make predictions, suggest improvements and explain observations over time.	Knowledge - I can group rocks by their absorbency. - I can group rocks by their reaction to acid rain (vinegar). - I can group rocks by their hardness. Working scientifically - I can use my results to choose the appropriate rock type for a specific use. - I can use my results to suggest a better choice of rock for a specific use. - I can use my results to predict how a rock will be affected by the weather.
	Lesson 3: Fossil formation Knowledge - To describe the process of fossil formation. Working scientifically - To present research on fossil formation.	Knowledge - I can list the different factors that break down rocks. - I can use a model to demonstrate fossil formation. - I can use a short film to sequence the steps of fossil formation. Working scientifically - I can research fossil formation using a single source. - I can present research in short film form.
	Lesson 4: Fossils and palaeontology Knowledge	Knowledge I can identify fossils in rocks.

	- To identify fossils and group rocks accordingly. Working scientifically - To use the fossil record to answer questions about the past.	- I can group rocks that contain fossils. - Science in action: I can describe the work of a palaeontologist. Working scientifically - I can use a model to determine the relative age of a fossil. - I can use the fossil record to suggest how a living thing has changed over time. - I can use the fossil record to suggest what living things were around in a certain era.
	Lesson 5: Soil formation Knowledge - To compare soils and how they were formed. Working scientifically - To record the drainage rate for different soils in a bar chart.	Knowledge - I can name some different types of soil. - I can describe some different types of soil. - I can compare and group soils according to their appearance. Working scientifically - I can draw the bars on a bar chart. - I can label the bars on a bar chart.
	Lesson 6: Soil layers and earthworms Knowledge - To describe a soil sample using sedimentation. Working scientifically - To draw and label a diagram.	Knowledge - I can list some of the benefits of earthworms to the soil. - I can identify the layers in a sedimentation jar. - I can describe the size of the particles in a sedimentation jar. Working scientifically - I can accurately draw the layers of sediment in a sedimentation jar. - I can accurately label the layers of sediment in a sedimentation jar.

Term and unit name	Learning Question	Corresponding Success Criteria.
Term 5: Making connections: How does wind force affect seed dispersal? (Y3/4 B)	Lesson 1 – Investigating seed dispersal – planning. Knowledge - To revise the units <i>Forces and magnets</i> and <i>Plant reproduction</i>. Working scientifically - To plan a comparative test.	Knowledge - I can describe how flowering plants reproduce. - I can explain why plants benefit from seed dispersal. - I can classify a force as a push, pull or twist. Working scientifically - I can sort variables. - I can identify the best prediction.
	Lesson 2 – Investigating seed dispersal – gathering data. Knowledge - To revise the units <i>Forces and magnets</i>, <i>Plant reproduction</i> and <i>States of matter</i>. Working scientifically - To gather and record data.	Knowledge - I can describe a force as a push, pull or twist. - I can model a wind-dispersed seed. - I can link forces and states of matter. Working scientifically - I can gather data. - I can measure accurately in centimetres. - I can record data in a results table.
	Lesson 3: Investigating seed dispersal – Analysing, concluding and evaluating. Knowledge - To revise the units <i>Classification and changing habitats</i>, <i>Plant reproduction</i> and <i>Forces and magnets</i>. Working scientifically - To conclude and evaluate the investigation.	Knowledge - I can group plants based on their characteristics. - I can describe what plants need to survive. - I can link a plant's needs to explain why seeds are dispersed from the parent plant. - I can explain my results using knowledge of forces. Working scientifically - I can draw a bar chart. - I can write a conclusion that refers to data. - I can evaluate the trustworthiness of a method and suggest improvements.
	Lesson 4: Investigating seed dispersal – Extending	Knowledge

	Knowledge - To revise the unit <i>Sound and vibrations</i> and <i>Forces and magnets</i>. Working scientifically - To pose and investigate new questions.	- I can describe how a sound forms and how it is measured. - I can describe how we hear a sound. - I can make links between the strength of vibrations and the volume of a sound. Working scientifically - I can pose questions. - I can compare results from different tests.
	Last lesson: Lesson 5: Investigating seed dispersal – Presenting Knowledge - To revise all the units across the year. Working scientifically - To report on my findings using a poster.	Knowledge - I can describe the wind dispersal of seeds. - I can explain why it is useful for seeds to be dispersed. - I can describe the human impact on seed dispersal. Working scientifically - I can create a poster to report on my findings from the enquiries. - I can assess the effectiveness of a presentation.
	None	

Term and unit name	Learning Question	Corresponding Success Criteria.
Term 6 Making connections: How does food affect muscle fatigue? (Year 3/4 A)	Lesson 1: Investigating muscle fatigue – Planning Knowledge - To revise the units <i>Movement and nutrition</i>, <i>Digestion and food</i> and <i>Rocks and soil</i>. Working scientifically - To plan a comparative test.	Knowledge - I can name different forms of energy. - I can assign different examples to their energy form. Working scientifically - I can form a prediction. - I can identify variables. - I can design a results table.
	Lesson 2: Investigating muscle fatigue – Gathering data Knowledge - To revise the units <i>Movement and nutrition</i> and <i>Digestion and food</i>. Working scientifically - To gather and record data.	Knowledge - I can describe the change of chemical energy into movement energy. - I can list the reasons for muscle fatigue. Working scientifically - I can gather data. - I can record data. - I can measure accurately in minutes and seconds.
	Lesson 3: Investigating muscle fatigue – Analysing, concluding and evaluating Knowledge - To revise the units <i>Movement and nutrition</i> and <i>Digestion and food</i>. Working scientifically - To conclude and evaluate the investigation.	Knowledge - I can describe the role of the digestive system. - I can explain how muscles get the energy they need to work. Working scientifically - I can draw a bar chart. - I can write a conclusion. - I can evaluate the trustworthiness of the method.
	Lesson 4: Investigating muscle fatigue – Extending Knowledge To revise the unit <i>Electricity and circuits</i>.	Knowledge - I can make a simple circuit. - I can describe the change of energy in a circuit. Working scientifically - I can pose new questions.

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	Working scientifically To pose and investigate new questions.	
	Last lesson: Lesson 5: Investigating muscle fatigue – Presenting Knowledge - To revise the unit <i>Light and shadows</i> and <i>Movement and nutrition</i>. Working scientifically - To report on my findings using a shadow puppet display.	Knowledge - I can describe how shadows are formed. - I can describe the role of joints in the skeleton. Working scientifically - I can summarise my findings. - I can use the results as evidence of my conclusions. - I can refer to the trustworthiness of my results.
	None	

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Kapow Year 5 Knowledge

Year 5

Knowledge

- To know that some substances will dissolve in a liquid to form a solution.
- To know the factors that affect the rate of dissolving, including temperature and stirring.
- To know that some liquids and solids can be separated using sieving, filtering and evaporation and to describe these processes.
- To describe a broader range of materials and their properties, including hardness, solubility, transparency, conductivity and response to magnets.
- To understand that dissolving, mixing and changes of state are reversible changes.
- To understand that some changes result in the formation of new materials and that these are usually irreversible. (e.g. burning, rusting, the action of acid on bicarbonate of soda.)
- To know that the Sun is a star at the centre of our solar system.
- To know that the Sun, Earth and Moon are approximately spherical bodies.
- To know the names, order and relative positions of the planets and other main celestial bodies.
- To know that a moon is a celestial body that orbits a planet and give examples of moons that orbit other planets.
- To know that the Earth and other planets orbit around the Sun.
- To know that the tilt of the Earth and its orbit around the Sun causes the seasons.
- To know that the Moon orbits around the Earth.

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- To understand how the Earth's rotation causes day and night and the apparent movement of the Sun across the sky.
- To know that a life cycle shows the changes an animal or plant goes through until the reproduction of a new generation when the cycle starts again.
- To know that all living things must reproduce for the species to survive.
- To know that sexual reproduction requires two parents, whereas asexual reproduction only requires one parent.
- To know that there are different processes plants and animals use to reproduce (asexual and sexual reproduction).
- To know that gravity is a non-contact force that pulls objects together.
- To know that air resistance and water resistance are both types of friction.
- To know that unsupported objects fall towards the Earth because of gravity.
- To know that friction, air resistance and water resistance act in the opposite direction to a moving object.
- To know that when forces are imbalanced, the speed, shape or direction of an object changes.
- To know that when forces are balanced the speed, shape or direction of an object stays the same.
- To know that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.
- To know that rougher surfaces have more friction between them than smoother surfaces and how that may affect movement.
- To know that the larger the surface area of an object the greater the air or water resistance it creates.
- To describe the human life cycle, including the stages of growth and development (baby, toddler, child, teenager, adult, elderly).
- To describe changes that occur during puberty (in boys and girls).
- To know that gestation periods vary across mammals.

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Kapow Year 6 Knowledge

Year 6

Knowledge

- To know that ‘organism’ is a term used to refer to an individual living thing.
- To know that micro-organisms are organisms that are incredibly small and cannot usually be seen by the naked eye.
- To know the characteristics of the different groups of vertebrate and commonly found invertebrates.
- To know that light travels in a straight line from a light source.
- To understand that luminous objects are seen as a result of light directly entering the eye, whereas non-luminous objects reflect light into the eye.
- To know that shiny surfaces reflect light uniformly.
- To know that when light is reflected off a surface, its direction changes.
- To know that mirrors and periscopes work using reflection of light on smooth surfaces.
- To understand why shadows have the same shape as the objects that cast them as a result of light travelling in straight lines.
- To understand relationships between light sources, objects and shadows.
- To understand how and why the distance between the object and the screen affects the size of the shadow.
- To understand how the angle of a reflected ray is affected by the angle of the incoming ray, when reflected from a plane surface.
- To know that living things have changed over time.
- To know that fossils provide us with information about living things that inhabited the Earth millions of years ago.

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- To know that characteristics are passed from parents to their offspring, but that all offspring vary from their parents.
- To know that over time, variation in offspring can affect animals' chances of survival in particular environments.
- To know that animals and plants have adapted to suit their environment over many millions of years and that this process can be called evolution.
- To know a wider variety of components in a series circuit (including buzzer and motor).
- To know the conventions used to draw circuit diagrams, including the recognised symbols for common components and using straight lines.
- To know that the voltage of a circuit can be changed and how this affects bulb brightness (or buzzer volume).
- To know the main parts of the human circulatory system (heart, blood vessels and blood).
- To know that the heart pumps blood around the body.
- To know that the blood vessels transport blood around the body.
- To know that the blood transports vital substances around the body, including oxygen and nutrients.
- To understand the relationships between different organ systems.
- To understand the impact of diet, exercise, drugs and lifestyle on the way a body functions.
- To know that the heart rate is the number of beats per minute.
- To know that exercise increases heart rate.

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National Curriculum UKS2 Knowledge

National curriculum — end of KS2

- asking relevant questions and using different types of scientific enquiries to answer them
- 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 thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.
- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
- investigate the way in which water is transported within plants
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.
- identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat

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- identify that humans and some other animals have skeletons and muscles for support, protection and movement.
- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
- describe in simple terms how fossils are formed when things that have lived are trapped within rock
- recognise that soils are made from rocks and organic matter.
- recognise that they need light in order to see things and that dark is the absence of light
- notice that light is reflected from surfaces
- recognise that light from the sun can be dangerous and that there are ways to protect their eyes
- recognise that shadows are formed when the light from a light source is blocked by an opaque object
- find patterns in the way that the size of shadows change.
- compare how things move on different surfaces
- notice that some forces need contact between two objects, but magnetic forces can act at a distance
- observe how magnets attract or repel each other and attract some materials and not others
- compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials
- describe magnets as having two poles
- predict whether two magnets will attract or repel each other, depending on which poles are facing.
- recognise that living things can be grouped in a variety of ways
- explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment

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- recognise that environments can change and that this can sometimes pose dangers to living things.
- describe the simple functions of the basic parts of the digestive system in humans
- identify the different types of teeth in humans and their simple functions
- construct and interpret a variety of food chains, identifying producers, predators and prey
- compare and group materials together, according to whether they are solids, liquids or gases
- observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
- identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
- identify how sounds are made, associating some of them with something vibrating
- recognise that vibrations from sounds travel through a medium to the ear
- find patterns between the pitch of a sound and features of the object that produced it
- find patterns between the volume of a sound and the strength of the vibrations that produced it
- recognise that sounds get fainter as the distance from the sound source increases.
- identify common appliances that run on electricity
- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery

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- recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- recognise some common conductors and insulators, and associate metals with being good conductors.
- 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 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.
- describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
- describe the life process of reproduction in some plants and animals.
- describe the changes as humans develop to old age.
- 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
- 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 gases to decide how mixtures might be separated, including through filtering, sieving and evaporating

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- give reasons, based on evidence from comparative and fair tests, for the particular 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 and the action of acid on bicarbonate of soda.
- describe the movement of the Earth, and other planets, relative to the Sun in the solar system
- describe the movement of the Moon relative to the Earth
- describe the Sun, Earth and Moon 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.
- 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 effect.
- 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.
- identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
- recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function

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- describe the ways in which nutrients and water are transported within animals, including humans.
- 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.
- recognise that light appears to 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.
- 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 recognised symbols when representing a simple circuit in a diagram

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Kapow Working Scientifically Year 5

Year 5

Skills

Posing questions

- Raising questions throughout the enquiry process.
- Identifying testable questions.
- Selecting the most appropriate enquiry method to answer questions and give justification.

Planning

- Suggesting which variables will be changed, measured and controlled.
- Making and explaining decisions about what observations to make and how long to make them for.
- Writing a method including detail about how to ensure control variables are kept the same.
- Writing a method that considers reliability by planning repeated readings.
- Suggesting the most appropriate equipment to make observations and measurements and justifying their choices.

Predicting

- Making increasingly scientific predictions by: ● Using previous scientific knowledge and evidence to inform their predictions. ● Using scientific language to describe a potential outcome or explain why they think something will happen. ● Making links between topics to evidence a prediction.

Observing (qualitative data)

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- Using their senses to describe, in detail and with a broader range of scientific vocabulary, what they notice or what has changed.

Measuring (quantitative data)

- Using standard units to measure and compare with increasing precision (decimals).
- Reading a wider variety of scales with unmarked intervals between numbers.

Researching

- Gathering answers to open-ended questions from a variety of sources.

Recording (diagrams)

- Drawing scientific diagrams by: ● Using a wider range of standard symbols. ● Drawing with increasing accuracy. ● Labelling with a broader range of scientific vocabulary. ● Annotating diagrams to explain concepts and convey opinions.

Recording (tables)

- Using tables with columns that allow for repeat readings.
- Suggesting headings to tables, including units.
- Designing results tables with increasing independence with consideration of variables where applicable.
- Calculating the mean average.

Graphing

- Representing data by using line graphs and scatter graphs.
- Plotting points with greater accuracy
- Reading the value of plotted points with greater accuracy.

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Analysing and drawing conclusions

- Writing a conclusion to summarise findings using increasingly complex scientific vocabulary.
- Suggesting with increasing independence how one variable may have affected another.
- Quoting relevant data as evidence of relationships.
- Identifying anomalies in repeat data and excluding results where appropriate.
- Comparing individual, class and/or model data to the prediction and recognising when they do not match.
- Using identified patterns to predict new values or trends.

Evaluating

- Identifying steps in the method that need changing and suggesting improvements.
- Identifying which variables were difficult to control and suggesting how to better control them.
- Commenting on the degree of trust by also reflecting on: ● Accuracy (human error with equipment). ● Reliability (repeating results). ● Sources of information (e.g. websites, books).
- Deciding what data to collect to further test direct relationships.

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Kapow Working Scientifically Year 6

Year 6

Skills

Posing questions

- Raising questions throughout the enquiry process.
- Identifying testable questions.
- Selecting the most appropriate enquiry method to answer questions and give justification.

Planning

- Suggesting which variables will be changed, measured and controlled.
- Making and explaining decisions about what observations to make and how long to make them for.
- Writing a method including detail about how to ensure control variables are kept the same.
- Writing a method that considers reliability by planning repeated readings.
- Suggesting the most appropriate equipment to make observations and measurements and justifying their choices.

Predicting

- Making increasingly scientific predictions by: ● Using previous scientific knowledge and evidence to inform their predictions. ● Using scientific language to describe a potential outcome or explain why they think something will happen. ● Making links between topics to evidence a prediction.

Observing (qualitative data)

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- Using their senses to describe, in detail and with a broader range of scientific vocabulary, what they notice or what has changed.

Measuring (quantitative data)

- Using standard units to measure and compare with increasing precision (decimals).
- Reading a wider variety of scales with unmarked intervals between numbers.

Researching

- Gathering answers to open-ended questions from a variety of sources.

Recording (diagrams)

- Drawing scientific diagrams by: ● Using a wider range of standard symbols. ● Drawing with increasing accuracy. ● Labelling with a broader range of scientific vocabulary. ● Annotating diagrams to explain concepts and convey opinions.

Recording (tables)

- Using tables with columns that allow for repeat readings.
- Suggesting headings to tables, including units.
- Designing results tables with increasing independence with consideration of variables where applicable.
- Calculating the mean average.

Grouping and classifying

- Grouping in a broader range of contexts.
- Organising the layout of number and branching keys.
- Formulating appropriate questions for classification keys.

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Graphing

- Representing data by using line graphs and scatter graphs.
- Plotting points with greater accuracy.
- Reading the value of plotted points with greater accuracy.

Analysing and drawing conclusions.

- Recognise the following across a broader range of contexts and in more complexity: ● Naturally occurring patterns and relationships. ● Making comparisons to group and classify. ● Changes over time. ● Relevant secondary data.
- Writing a conclusion to summarise findings using increasingly complex scientific vocabulary.
- Suggesting with increasing independence how one variable may have affected another.
- Quoting relevant data as evidence of relationships.
- Identifying anomalies in repeat data and excluding results where appropriate.
- Comparing individual, class and/or model data to the prediction and recognising when they do not match.
- Using identified patterns to predict new values or trends.

Evaluating

- Identifying steps in the method that need changing and suggesting improvements.
- Identifying which variables were difficult to control and suggesting how to better control them.
- Commenting on the degree of trust by also reflecting on: ● Accuracy (human error with equipment). ● Reliability (repeating results). ● Sources of information (e.g. websites, books).

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- Deciding what data to collect to further test direct relationships.

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National curriculum — end of KS2 Working Scientifically

- asking relevant questions and using different types of scientific enquiries to answer them
- 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 thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.
- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
- investigate the way in which water is transported within plants
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.
- identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat
- identify that humans and some other animals have skeletons and muscles for support, protection and movement.

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- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
- describe in simple terms how fossils are formed when things that have lived are trapped within rock
- recognise that soils are made from rocks and organic matter.
- recognise that they need light in order to see things and that dark is the absence of light
- notice that light is reflected from surfaces
- recognise that light from the sun can be dangerous and that there are ways to protect their eyes
- recognise that shadows are formed when the light from a light source is blocked by an opaque object
- find patterns in the way that the size of shadows change.
- compare how things move on different surfaces
- notice that some forces need contact between two objects, but magnetic forces can act at a distance
- observe how magnets attract or repel each other and attract some materials and not others
- compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials
- describe magnets as having two poles
- predict whether two magnets will attract or repel each other, depending on which poles are facing.
- recognise that living things can be grouped in a variety of ways
- explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
- recognise that environments can change and that this can sometimes pose dangers to living things.

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- describe the simple functions of the basic parts of the digestive system in humans
- identify the different types of teeth in humans and their simple functions
- construct and interpret a variety of food chains, identifying producers, predators and prey
- compare and group materials together, according to whether they are solids, liquids or gases
- observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
- identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
- identify how sounds are made, associating some of them with something vibrating
- recognise that vibrations from sounds travel through a medium to the ear
- find patterns between the pitch of a sound and features of the object that produced it
- find patterns between the volume of a sound and the strength of the vibrations that produced it
- recognise that sounds get fainter as the distance from the sound source increases.
- identify common appliances that run on electricity
- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
- recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit

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- recognise some common conductors and insulators, and associate metals with being good conductors.
- 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 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.
- describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
- describe the life process of reproduction in some plants and animals.
- describe the changes as humans develop to old age.
- 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
- 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 gases to decide how mixtures might be separated, including through filtering, sieving and evaporating

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- give reasons, based on evidence from comparative and fair tests, for the particular 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 and the action of acid on bicarbonate of soda.
- describe the movement of the Earth, and other planets, relative to the Sun in the solar system
- describe the movement of the Moon relative to the Earth
- describe the Sun, Earth and Moon 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.
- 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 effect.
- 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.
- identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
- recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function

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- describe the ways in which nutrients and water are transported within animals, including humans.
- 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.
- recognise that light appears to 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.
- 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 recognised symbols when representing a simple circuit in a diagram