| Unit | Lesson name | Lesson No. | Learning objective | Expected Standard (EXS) | Greater depth (GDS) |
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| **Classifying big and small** | Carl Linnaeus and classification | 1 | **Knowledge**: To explain how organisms are classified using the Linnaean system. | Defining the term organism; naming some of the life processes; briefly describing the work of Carl Linnaeus; reproducing the Linnaean system diagram. **You must cover: movement, respiration, sensitivity, growth, reproduction, excretion and nutrition.** | Naming all the life processes and describing each of them (except for respiration); explaining how modern science has refined the Linnaean system. |
| | Cold-blooded vertebrates | 2 | **Knowledge**: To classify the cold-blooded vertebrate groups using their common characteristics. | Defining a vertebrate and naming the vertebrate groups; describing some of the characteristics of fish, amphibians and reptiles and using a branching classification key. **You must cover: mammal, reptile, amphibian, bird and fish.** | Researching and describing the characteristics of fish, amphibians and reptiles in greater detail; comparing the similarities and differences between cold-blooded vertebrates. |
| | Warm-blooded vertebrates | 3 | **Knowledge**: To classify the warm-blooded vertebrate groups using their common characteristics. | Describing and comparing some of the characteristics of birds and mammals and using a branching key to classify them. | Researching, describing and comparing the characteristics of birds and mammals in more depth; comparing vertebrate groups; writing appropriate questions for a classification key to sort and classify birds and mammals. |
| | Invertebrates | 4 | **Knowledge**: To classify invertebrates. | Defining invertebrates and naming, describing and comparing some of their characteristics; using a number key to classify invertebrates. **You must cover: insects, crustaceans and arachnids.** | Describing and modelling invertebrates in more detail; creating and using a table to compare the characteristics of invertebrates. |
| | Plants | 5 | **Knowledge**: To describe how the plant kingdom is organised (based on shared characteristics). **Working scientifically:** To produce a working classification key. | Naming the plant groups and describing some of the characteristics of mosses, ferns, conifers and flowering plants; making either a simple number key or a branching key to classify leaves. | Researching and describing the characteristics of mosses, ferns, conifers and flowering plants in more detail; making a more complex branching and number key to classify more leaves. |
| | Micro-organisms | 6 | **Knowledge**: To describe and classify micro-organisms. | Defining a micro-organism and naming some examples; describing some of the structures found in bacteria; using a classification key to classify shapes of bacteria. **You must cover: germs, bacteria, viruses and fungi.** | Explaining why some bacteria have certain structures, linked to adaptation; drawing a bacterium diagram. |
| **Light and reflection** | The pathway of light | 1 | **Knowledge**: To describe the pathway of light. **Working scientifically:** To use evidence to form conclusions. | Describing similarities and differences between light sources; describing that light travels from these light sources to our surroundings, which enables us to see; describing that light travels in a straight line; describing observations that are evidence of light travelling in a straight line. | Explaining why the choice of material of the equipment can impact the results, for example, opaque materials block light but transparent ones allow light to pass through easily. |
| | See the light | 2 | **Knowledge**: To describe how we see. **Working scientifically:** To draw scientific diagrams. | Describing how we see luminous and non-luminous objects; explaining how the eyes can be protected from too much light; drawing ray diagrams using a pencil and ruler, with light rays travelling in continuous, straight lines from a light source to the eye. | Explaining how changing the material of objects in a ray diagram can affect the outcome; explaining why some animals have eyes on the side of their heads and how this affects what they see. |
| | Measuring shadows | 3 | **Knowledge**: To explain how shadows change. **Working scientifically:** To pose questions. | Recalling that the position and distance of the light source can affect a shadow's size; describing that the closer an object is to a screen, the smaller the shadow will be; explaining why shadows are affected by the distance between the object and the screen using a ray diagram; explaining why the shape of the shadow is the same as the object that cast it using a ray diagram. | Describing that shadows cast closer to a light source appear sharper but shadows cast further from the light source have blurrier edges; explaining that multiple light sources can cause a shadow's edge to appear blurry as different shadows are being cast at the same time; suggesting improvements to the practical method to improve the maintenance of control variables and quality of results. |

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| | Reflecting light | 4 | **Knowledge**: To investigate what affects the angle of the reflected ray.<br>**Working scientifically:** To record results as a line graph. | Describing how light is reflected from a smooth mirror surface, naming the incoming and reflected rays; describing the relationship between the angle of the incoming ray and the angle of the reflected ray; using a protractor to gather data about angles and recording this as a line graph; using the line graph to extrapolate and predict missing values. | Explaining why this relationship is only true for a smooth, reflective surface such as a mirror; predicting what may be observed if a different material or surface was used in the experiment; identifying similarities and differences between the demonstrations of light passing through a hose and a stream of water. |
| | Making a periscope | 5 | **Knowledge**: To explain how a periscope works. | Building a working periscope using two mirrored surfaces that reflect light; describing the pathway of light from an object, through the periscope and into the eye; drawing a labelled ray diagram to explain how the periscope works. | Designing their own working periscope using provided materials; evaluating the strengths and weaknesses of their design and suggesting improvements. |
| | Using mirrors | 6 | **Knowledge**: To explain how mirrors are helpful.<br>**Science in action:** To explore different jobs or inventions that depend on reflection. | Recalling a range of uses of mirrors; describing how the mirror is useful in a particular scenario; describing how light is reflected in the particular scenario; identifying a similarity or difference between different uses of mirrors. | Evaluating how useful a mirror is in a particular scenario by considering the advantages and disadvantages; drawing comparisons between different uses of mirrors, including both similarities and differences. |
| **Evolution and inheritance** | Variation | 1 | **Knowledge**: To explain why there are differences within a species.<br>**Working scientifically:** To group factors. | Defining variation as differences between individuals of the same species; identifying variation in organisms; recalling that variation is caused by inherited and environmental factors and sorting examples as environmental variation, inherited variation or a mixture of both. | Identifying their own examples of variation that can be added to the Venn diagram. |
| | Inheritance | 2 | **Knowledge**: To recognise the inheritance of characteristics in plants and animals. | Identifying variation within a species and examples of inherited characteristics; recalling that living things produce offspring of the same kind but are not normally identical to their parents; describing patterns of inheritance from parent to offspring in a given example or family tree. | Considering the ethics of selective breeding by considering why people may think it is right or wrong and whether rules should vary for different living things. |
| | Adaptations | 3 | **Knowledge**: To explain why adaptation is necessary. | Recalling that an adaptation is a characteristic that helps an organism to survive in its habitat; recalling that adaptations cannot be chosen and are usually inherited; describing key characteristics that would help an organism to survive; explaining how an adaptation helps the organism to survive. | Evaluating a creature's chances of survival by explaining how multiple features help survival and suggesting improvements for any detrimental characteristics. |
| | Modelling natural selection | 4 | **Knowledge**: To model how natural selection affects population size.<br>**Working scientifically:** To evaluate the degree of trust and pose new questions for further enquiry. | Describing relevant variation in a given population; explaining how variation can affect the survival of some individuals over others; recalling that natural selection is the process where living things that are better adapted are more likely to survive, whereas those worse adapted are more likely to die. | Considering other factors that may affect the finch's survival and explaining using scientific ideas. |
| | Evolution | 5 | **Knowledge**: To describe the theory of evolution.<br>**Working scientifically:** To consider evidence used to inform theories. | Recalling what evolution is; identifying differences between a living thing and its ancestor; describing key steps in the evolution of a species, including variation and those better adapted surviving and reproducing; describing some of the evidence used to form the theory of evolution, including fossils. | Using a comic strip template with limited prompts to independently summarise some of the key steps involved in the evolution of mammoths; suggesting different environmental factors that may cause a species to evolve differently, such as warmer weather causing mammoths to evolve with less fur. |
| | Evidence for evolution | 6 | **Knowledge**: To recognise evidence that can be used for evolution.<br>**Working scientifically:** To consider the degree of trust in the evidence used. | Recalling different types of evidence that can be used to explain evolution; describing methods that make scientists' results or conclusions more trustworthy. | Using both the advantages and disadvantages of a type of evidence when justifying their opinions about the degree of trust. |
| **Circuits, batteries and switches** | Components and circuits | 1 | **Knowledge**: To use recognised symbols for electrical components. | Identifying and using standard circuit symbols; describing the function of key electrical components; explaining how the models used in the lesson represent electrical components. **You must cover: cell, wire, bulb, motor, switch and buzzer.** | Evaluating the models of electrical circuits by considering the strengths and weaknesses of their representation. |

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| | Circuit diagrams | 2 | **Knowledge**: To predict and present results for electrical circuits.<br>**Working scientifically:** To use standardised symbols when drawing diagrams. | Correctly predicting if an electrical circuit will work or not; explaining why a circuit will work or not using their knowledge of complete loops, power sources and presence of components; drawing circuit diagrams with straight lines and using standard circuit symbols. | Deciding how to best advise other people about working with electrical circuits safely. |
| | Current and resistance | 3 | **Knowledge**: To recognise a link between the number of components and resistance.<br>**Working scientifically:** To explain results using scientific knowledge. | Describing the relationship between the number of bulbs in a circuit and the bulb brightness; describing the link between the number of components and the amount of resistance; explaining that increasing the number of components increases the resistance and this affects the flow of current and energy transferred. | Suggesting situations that would benefit from knowing how the number of components/bulbs affects the output/brightness. |
| | Batteries and voltage | 4 | **Knowledge**: To identify ways to change voltage within an electrical circuit.<br>**Working scientifically:** To design a results table. | Identifying that batteries are a voltage source and that they come in different voltages; describing how voltage affects bulb brightness; designing a results table with an appropriate number of columns and headings with units. | Planning an experiment to test how voltage affects the brightness of a bulb, with consideration for the changed, measured and control variables; explaining how control variables can be kept the same. |
| | Voltage and bulb brightness | 5 | **Knowledge**: To investigate how voltage affects bulb brightness.<br>**Working scientifically:** To plan an enquiry. | Describing that voltage can be changed by using different numbers of cells in a circuit; identifying the changed variable and the measured variable; suggesting some control variables; describing that more cells or a higher voltage causes brighter bulbs; using the relationship between voltage and bulbs to predict what will happen with buzzers and motors. | Designing a new experiment to investigate the relationship between voltage and motor function; naming the changed variable and suggesting a measured variable; suggesting control variables. |
| | Practical circuits | 6 | **Knowledge**: To apply knowledge of circuits and components to a practical solution.<br>**Science in action:** To recognise that scientific knowledge can solve a problem. | Building an electrical circuit with a switch to control its function; drawing a circuit diagram that represents the circuit used, including standard circuit symbols; explaining how the switch and the electrical circuit solve the problem. | Evaluating how effective the circuits are in solving the problem, considering the advantages and disadvantages of the circuit and build. |
| **Circulation and exercise** | Factors affecting health | 1 | **Knowledge**: To identify factors that affect our health and how to reduce their negative impact.<br>**Working scientifically:** To evaluate sources of information. | Recalling factors that improve someone's health and those that impact health negatively; suggesting improvements to someone's health; evaluating the trustworthiness of secondary sources that provide health advice. | Considering the likelihood of their advice being adopted by a patient to support evaluating its impact, such as suggesting someone takes the stairs instead of using a lift is more likely to be done than taking up a gym membership. |
| | The heart and circulatory system | 2 | **Knowledge**: To summarise the key structures and purpose of the circulatory system. | Describing the circulatory system as the heart and blood vessels transporting blood around the body; recalling that the heart is a pump that pushes blood through the circulatory system; describing the pathway of blood through the circulatory system, including passing through the heart twice in a complete circuit through the body. | Identifying similarities and differences between the human and fish circulatory systems. |
| | Blood | 3 | **Knowledge**: To identify the key roles of blood.<br>**Working scientifically:** To evaluate a model. | Describing some of the functions of blood, including transporting substances like oxygen, water and nutrients around the body; describing that nutrients and water are absorbed from the digestive system into the blood to be transported around the body; evaluating the model by considering a strength and weakness when representing blood and suggesting improvements. | Evaluating the blood model by discussing both strengths and weaknesses of its representation of blood and suggesting improvements with justification of why it is better. |
| | Heart rate | 4 | **Knowledge**: To explore the relationship between animal size and heart rate.<br>**Working scientifically:** To interpret patterns in data. | Recalling what is meant by heart rate and researching using multiple websites to find reliable animal masses; identifying the pattern between animals' size and heart rate and quoting values as evidence; comparing class values and recognising when they do not match; using the identified patterns to predict new values. | Evaluating the research of animals' masses and explaining why the class may have different values. |

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| | Investigating exercise and heart rate | 5 | **Knowledge**: To investigate the relationship between exercise and heart rate.<br>**Working scientifically:** To write a method. | Describing how different exercises affect heart rate; explaining why heart rate changes during exercise; writing a method for an enquiry with consideration of equipment, the different versions of the changed variable and how to complete the measured variable. | Planning how to investigate the effect of further exercises or factors on heart rate, considering the changed, measured and controlled variables. |
| | Heart rate and fitness | 6 | **Knowledge**: To describe the relationship between heart rate and fitness.<br>**Working scientifically:** To draw a line graph. | Describing what happens to heart rate during and after exercise; comparing two sets of heart data; identifying a link between heart rate and fitness; choosing a suitable title and axes labels with units for the line graph; plotting points on the line graph. | Plotting two sets of heart rate data on the same line graph with greater accuracy and independence. |
| **Are some sunglasses safer than others?** | Investigating sunglasses - Planning | 1 | **Knowledge**: To revise the units Circulation and health and Light and reflection.<br>**Working scientifically:** To plan a comparative test. | Recalling that sun safety is important to be healthy; describing that light is blocked by opaque materials but can pass through transparent and translucent materials in varying amounts and light must pass through the lens and enter our eye for us to see through them; describing how our eyes are protected from sunlight (naturally or artificially); forming a prediction using scientific knowledge; suggesting which variables will be changed, measured and controlled; writing a method with reference to how control variables can be kept the same; designing a results table that allows for repeat readings to be taken. | Explaining why control variables must be kept the same to prevent an effect on the measured variable (the light passing through the sunglasses). |
| | Investigating sunglasses - gathering data | 2 | **Knowledge:** To revise the units Light and reflection and Circuits, batteries and switches.<br>**Working scientifically:** To gather and record data. | Recalling a range of light sources; demonstrating how to build an electrical circuit to provide a consistent light source; using a light meter or data logger app to measure light intensity and recording results in a table; calculating the mean average from repeat readings. | Implementing a method that uses independently devised strategies to keep control variables the same. |
| | Investigating sunglasses - Analysing, concluding and evaluating | 3 | **Knowledge:** To revise the units Light and reflection and Circulation and health.<br>**Working scientifically:** To conclude and evaluate the investigation. | Describing how light passing through the different sunglasses varies; explaining that too much light passing through sunglasses may damage the eyes and affect visual health; drawing a bar chart and writing a conclusion based on individual group results; evaluating the trustworthiness of results by considering how well the control variables were kept the same; posing further questions to extend the enquiry. | Drawing accurate bar charts for both individual group and class data and making comparisons between the sets of results; comparing the similarity of repeat readings and sets of data as part of evaluating and judging the trustworthiness of the results. |
| | Investigating sunglasses - Extending | 4 | **Knowledge**: To revise the units Classifying big and small, Evolution and inheritance and Circulation and health.<br>**Working scientifically:** To use further data to inform a conclusion. | Classifying animals based on their physical properties; explaining how animals are adapted to withstand sun exposure; describing how UV exposure can affect health; predicting which pair of sunglasses will best protect from UV using prior results; collecting further data to answer a question and comparing results from different tests. | Justifying which pair of sunglasses is the best by using multiple sets of data and other factors, such as aesthetics or eye coverage. |
| | Investigating sunglasses - Presenting | 5 | **Knowledge:** To revise the units Light and reflection and Circulation and health.<br>**Working scientifically:** To report on finds in the form of an advert. | Describing how light travels and how we see; explaining why sunglasses are needed to maintain health; summarising findings from experiments and using the results as evidence of these conclusions; referring to the trustworthiness of the results. | Using a broad range of scientific vocabulary; evaluating the degree of trust in their results when concluding about their investigations. |