|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Topic** | **National Curriculum Outcomes**  *(Endpoints children will achieve)* | **Substantive Knowledge**  *(specific facts, e.g. herbivores feed on plants linked to: Living things and habitats; Animals including humans, Plants, materials, Rocks, Forces and magnets, evolution and inheritance, electricity, light, Earth and space.* | **Disciplinary Knowledge**  *(Know how to … be able to… know that…because….)*  *Working scientifically* | **Concepts**  *(discovery, change, investigation, cause and consequence)* | **Vocabulary** | **Culture**  *(What is wonderful and awesome in Science? How do children feel successful and show/ promote this?What enrichment?)* |
|  |  |  | Children will know how to/be able to: | Children will know how to/be able to: | Children will appreciate: | Children will recall and verbalise: |  |
|  | Light | * Sc3/4.1a recognise that they need light in order to see things and that dark is the absence of light * Sc3/4.1b notice that light is reflected from surfaces * Sc3/4.1c recognise that light from the Sun can be dangerous and that there are ways to protect their eyes * Sc3/4.1d recognise that shadows are formed when the light from a light source is blocked by a solid object * Sc3/4.1e find patterns in the way that the size of shadows change.   **WORKING SCIENTIFICALLY**  • Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them  • Sc4/1.2 setting up simple practical enquiries, comparative and fair tests  • Sc4/1.3 making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers  • Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions  • Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables  • Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions  • Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions  • Sc4/1.8 identifying differences, similarities or changes related to simple scientific ideas and processes  • Sc4/1.9 using straightforward scientific evidence to answer questions or to support their findings. | **Know that they need light in order to**  **see things and that dark is the absence**  **of light.**  . | **Recognise that shadows are formed**  **when the light from a light source is**  **blocked by a solid object.**  **Recognise that light from the Sun can**  **be dangerous and that there are ways**  **to protect their eyes.**  **Notice that light is reflected from**  **surfaces.**  **WORKING SCIENTIFICALLY**   * **Know that we can ask questions and answer them by setting up scientific enquiries** * **Know how to make relevant predictions that will be tested in a scientific enquiry** * **Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches** * **Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table** * **Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion** * **Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry** * **Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry** | * Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same * Know that scientific enquiries can suggest relationships, but that they do not prove whether a prediction is true * Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc) * Know that they can draw conclusions from the findings of other scientists   Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry | **wave,** mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source, data logger  Know and use the terms absorption, energy, property and reflection  **WORKING SCIENTIFICALLY**  prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis |  |
| Forces and Magnets | • Sc3/4.2a compare how things move on different surfaces  • Sc3/4.2b notice that some forces need contact between 2 objects, but magnetic forces can act at a distance  • Sc3/4.2c observe how magnets attract or repel each other and attract some materials and not others  • Sc3/4.2d 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  • Sc3/4.2e describe magnets as having 2 poles  • Sc3/4.2f predict whether 2 magnets will attract or repel each other, depending on which poles are facing.  **WORKING SCIENTIFICALLY**  • Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them  • Sc4/1.2 setting up simple practical enquiries, comparative and fair tests  • Sc4/1.3 making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers  • Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions  • Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables  • Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions  • Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions  • Sc4/1.8 identifying differences, similarities or changes related to simple scientific ideas and processes  • Sc4/1.9 using straightforward scientific evidence to answer questions or to support their findings. | **Know that objects move differently on**  **rough and smooth surfaces; objects**  **resist movement more on rough**  **surfaces because there is higher**  **friction as the object moves**  **Know that there are also non-contact**  **forces that can act between objects**  **without them touching and that**  **magnetism is an example of a non-**  **contact force**  **Know that magnets have two poles**  **called north and south.**  **Know that some materials are**  **magnetic, meaning that they are**  **attracted to a magnet, while other**  **materials are non-magnetic** | * **Know that we can ask questions and answer them by setting up scientific enquiries** * **Know how to make relevant predictions that will be tested in a scientific enquiry** * **Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches** * **Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table** * **Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion** * **Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry** | * Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same * Know that scientific enquiries can suggest relationships, but that they do not prove whether a prediction is true * Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc) * Know that they can draw conclusions from the findings of other scientists   Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry | magnetic, non-magnetic, pole, north, south, sliding friction, static friction, elastic, resist, attraction, repulsion  **WORKING SCIENTIFICALLY**  prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis |  |
| Plants | * Sc3/2.1a identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers * Sc3/2.1b 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 * Sc3/2.1c investigate the way in which water is transported within plants * Sc3/2.1d explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.   **WORKING SCIENTIFICALLY**  • Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them  • Sc4/1.2 setting up simple practical enquiries, comparative and fair tests  • Sc4/1.3 making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers  • Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions  • Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables  • Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions  • Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions  • Sc4/1.8 identifying differences, similarities or changes related to simple scientific ideas and processes  • Sc4/1.9 using straightforward scientific evidence to answer questions or to support their findings. | **Know the requirements of plants for**  **life and growth.**  **Know how water is transported in**  **plants.**  **Know the parts of a flowering plant**  **needed for pollination.**  **Know the lifecycle of a plant.** | **Know how to identify and describe the functions of different parts of plants.**  **WORKING SCIENTIFICALLY**   * **Know that we can ask questions and answer them by setting up scientific enquiries** * **Know how to make relevant predictions that will be tested in a scientific enquiry** * **Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches** * **Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table** * **Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion** * **Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry** | * Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same * Know that scientific enquiries can suggest relationships, but that they do not prove whether a prediction is true * Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc) * Know that they can draw conclusions from the findings of other scientists   Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry | extinction, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilization, vitamin, balanced diet, cartilage, invertebrate, contract, loosen, ribcage, insect  **WORKING SCIENTIFICALLY**  prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis |  |
|  |  |
| Rocks and Fossils | • Sc3/3.1a compare and group together different kinds of rocks on the basis of their appearance and simple physical properties  • Sc3/3.1b describe in simple terms how fossils are formed when things that have lived are trapped within rock  • Sc3/3.1c recognise that soils are made from rocks and organic matter.  **WORKING SCIENTIFICALLY**  • Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them  • Sc4/1.2 setting up simple practical enquiries, comparative and fair tests  • Sc4/1.3 making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers  • Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions  • Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables  • Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions  • Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions  • Sc4/1.8 identifying differences, similarities or changes related to simple scientific ideas and processes  • Sc4/1.9 using straightforward scientific evidence to answer questions or to support their findings. | * **Know there are three kinds of rocks: igneous, sedimentary and metamorphic and name some types of each.** * **Know how each type of rocks are formed.** * **Know, in simple terms, how fossils are formed.**   **Know that soil is made from tiny**  **particles of rock broken down by the**  **action of weather (weathering) and**  **this alongside organic matter makes up**  **soil.** | * **Know that we can ask questions and answer them by setting up scientific enquiries** | * Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same * Know that scientific enquiries can suggest relationships, but that they do not prove whether a prediction is true * Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc) * Know that they can draw conclusions from the findings of other scientists   Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry | **extinction,** igneous,  metamorphic,  sedimentary,  palaeontologist,  weathering,  molten rock,  crust,  tectonic plates,  scavengers, fossil  **WORKING SCIENTIFICALLY**  prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis |  |
| **Animals Including Humans** | Sc3/2.2a 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  Sc3/2.2b identify that humans and some other animals have skeletons and muscles for support, protection and movement  **WORKING SCIENTIFICALLY**  • Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them  • Sc4/1.2 setting up simple practical enquiries, comparative and fair tests  • Sc4/1.3 making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers  • Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions  • Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables  • Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions  • Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions  • Sc4/1.8 identifying differences, similarities or changes related to simple scientific ideas and processes  • Sc4/1.9 using straightforward scientific evidence to answer questions or to support their findings. | Know proteins are good for growth,  carbohydrates for energy and fruit and  vegetables provide vitamins and  minerals which help keep us healthy  (e.g. calcium for healthy bones and  teeth).  Know animals, including humans, have  a skeleton or an exoskeleton and  invertebrates have water held inside  by muscles which act as a skeleton.  Know skeletons provide support for  muscles and protect the body.  Know muscles are for support,  protection and movements and can  only contract, so they must be  arranged in pairs | Know that getting the right amount of each food group (including over half of the diet made up of fruit, vegetables and carbohydrates) is called a balanced diet  **WORKING SCIENTIFICALLY**   * Know that we can ask questions and answer them by setting up scientific enquiries * Know how to make relevant predictions that will be tested in a scientific enquiry * Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches * Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table * Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion * Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry * Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry |  | Movement, Muscles, Bones, Skull, Nutrition, Skeletons,  **WORKING SCIENTIFICALLY**  prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis |  |