Step 2

Subject: Science Key Stage: 4 Cycle: 1

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| Autumn 1 | Overview:  Inheritance, Independence and Evolution |  | Autumn 2 | Overview:  Inheritance, Independence and Evolution |  |
| MLD  Competition   * Recall two things that plants need in order to survive and grow. * Name all four things that plants growing in the same place compete for. (Light, space, water and nutrients from the soil). * Look at an example of a group of plants e.g. an area of woodland, and predict which factor (light, space, water or nutrients) is the MOST important one for a particular plant in that situation, giving a reason their choice. * Recall two things that animals need to survive. * Name all three things which animals compete for. (Food, mates and territory). * Look at an example of a group of animals and say what they are competing for, and explain which is the main factor. E.g. a food plant covered in caterpillars, two male deer fighting, and a rock covered in sea birds with their nests.   Adaptation   * Correctly identify one adaptation for an animal that lives in an extreme environment. eg a named adaptation of a polar bear or cactus plant. * Correctly identify an adaptation for extreme cold and an adaptation for extreme heat or drought on at least one organism for each environment. Explain in simple terms how this benefits the each organism’s survival. * Apply knowledge and understanding of adaptations to an ‘unknown’ organism, given information about where it lives. Conversely, student could guess what type of habitat, environment or conditions it lives in by looking at its adaptations. * Name one way in which the environment changes. * Name one living and one non-living factor for environmental change. * Go on to explain the impact of that change on a named organism.   Photosynthesis   * Recall that the Sun is needed for there to be life on Earth. * Recall that the process which changes light energy into chemical energy (food) is called photosynthesis. This happens in green plants. * Be able to write or complete a word equation for photosynthesis and go on to say what the energy-rich product sugar can go on to make and be stored as other substances.   Waste   * To recall that when living things die and decay, that the materials they are made from pass back into the environment. * State that the organisms which cause decay are microorganisms. * Describe conditions in which microorganisms make decay happen the fastest. | |  | TDA  One of the following:   * Investigate whether or not two characteristics are linked, eg finger length and height * Investigate the link between seed size and plant size * Investigate how alike the plants grown from runners are, eg mint or strawberry * Investigate whether rainwater in a city is more acidic than rainwater in the country * Compare the growth of plants when seeds are planted at different densities * Compare the water quality of running water and still water * Investigate the rate of photosynthesis in pond weed * Investigate the use of choice chambers, eg with woodlice   Cells   * Can identify the nucleus in a cell. State that it controls the cell. * State that the nucleus contains our genes which control what we look like. * State that the genes are found on structures called chromosomes. Name a characteristic controlled by our genes.   Inheritance   * State that you look like your parents because they have passed their genes on to you. * State that these characteristics are passed on from parents in their sex cells which then go on to make offspring. * That offspring have genes from both parents, so they are similar but different to each parent. Each offspring will have its own combination of characteristics. Offspring show variation. * Recall or demonstrate how to take a cutting and also that this is a way of getting new plants without having to grow them from seed. * State that the plants grown from cuttings all have the same genes and are identical to the parent plant. * Explain the difference between the genes of a plant grown from seed compared to a plant grown from a cutting. State a definition of asexual reproduction.   Evolution   * Recall that life on Earth has changed over a very long period of time. * State that this change is called ‘evolution,’ and that all life on earth began as simple life-forms which gradually became more complex. * Give an example of why fossils help to explain evolution. | |  |
| Autumn 1 | Overview:  Inheritance, Independence and Evolution |  | Autumn 2 | Overview:  Inheritance, Independence and Evolution |  |
| SLD  Competition   * Recall two things that plants need in order to survive and grow. * Name all two things that plants growing in the same place compete for (Light, space, water and nutrients from the soil) * Recall two things that animals need to survive. * Name all one thing which animals compete for (Food, mates and territory).   Adaptation   * Correctly identify one adaptation for an animal that lives in an extreme environment. eg a named adaptation of a polar bear or cactus plant. * Correctly identify an adaptation for extreme cold and an adaptation for extreme heat or drought on at least one organism for each environment. * Name one way in which the environment changes.   Photosynthesis   * Recall that the Sun is needed for there to be life on Earth. * Recall that the process which changes light energy into chemical energy (food) is called photosynthesis. This happens in green plants.   Waste   * To recall that when living things die and decay, that the materials they are made from pass back into the environment. * State that the organisms which cause decay are microorganisms. * Describe conditions in which microorganisms make decay happen the fastest. | |  | TDA  One of the following:   * Investigate whether or not two characteristics are linked, eg finger length and height * Investigate the use of choice chambers, eg with woodlice   Cells   * Can identify the nucleus in a cell. State that it controls the cell. * State that the nucleus contains our genes which control what we look like. * State that the genes are found on structures called chromosomes. Name a characteristic controlled by our genes.   Inheritance   * State that you look like your parents because they have passed their genes on to you. * State that these characteristics are passed on from parents in their sex cells which then go on to make offspring. * Recall or demonstrate how to take a cutting and also that this is a way of getting new plants without having to grow them from seed. * State that the plants grown from cuttings all have the same genes and are identical to the parent plant.   Evolution   * Recall that life on Earth has changed over a very long period of time. * State that this change is called ‘evolution,’ and that all life on earth began as simple life-forms which gradually became more complex. * Give an example of why fossils help to explain evolution. | |  |

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| Spring 1 | Overview:  Materials from the Earth |  | Spring 2 | Overview:  Materials from the Earth |  |
| MLD  Atoms   * Know that all materials are made up of atoms * Be able to describe an atom as the smallest particle of a substance * Know that all atoms of the same element are identical. * Explain that when atoms of different elements combine they form compounds * Be able to write a simple word equation   Building Materials   * Correctly identify calcium carbonate as a constituent of limestone. * Know that limestone has to be dug from the ground in quarries, and know some of the social, economic and environmental effects of quarrying. * Understand why limestone is an important building material and suggest some of its uses. * Describe how cement is made from limestone and how cement can be used to make mortar and concrete   Metals and Alloys   * Explain the meaning of the term “ore” * Name an unreactive metal that can be found as the metal itself in the Earth. * Suggest why most metals are found as compounds in the Earth. * Explain why scrap metal should be recycled. * Know why most iron is converted into steel. * Understand the meaning of the term “alloy” * Name some examples of alloys * Explain why iron, copper, gold and aluminium are usually made into alloys. * Know that copper is a good conductor of heat and electricity. * Give reasons why aluminium is a useful metal. | |  | MLD  TDA  Investigate one of the following:   * The strength of different mixes of concrete * The strength of different alloys or steels * The effects of acids on metals * The gases produced when a fuel is burned * The viscosity of different oils   Crude oil   * Describe what sort of substance crude oil is, and where it can be found. * Know that before it is used, crude oil is separated into different fractions by heating it. * State that the distillation of crude oil takes place in a refinery. * Name some of the useful products that can be obtained from crude oil.   Pollutants   * Recall the names of some fuels. * State that most fuels contain carbon and/or hydrogen. * Understand that when fuels are burned they release energy. * State that when a fuel containing carbon is burned, carbon dioxide and water vapour are released. * Know that some fuels contain sulfur which produces sulfur dioxide when burned. * Know that carbon dioxide produces global warming and sulfur dioxide produces acid rain.   Carbon Monoxide   * Know that without adequate ventilation, carbon monoxide and soot may be produced when a fuel is burned. * Know that carbon monoxide is a poisonous gas. | |  |
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| Summer 1 | Overview:  Sports Science |  |
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Cycle: 2

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| Autumn 1 | Overview:  Keeping Healthy | Ref | Autumn 2 | Overview:  Keeping Healthy | Ref |
| MLD  Reflex Actions   * Recall what reflex actions are like. * Name or sort and demonstrate two reflex actions.   Healthy Diet   * Recall the food you would eat if you were sitting down to a healthy, balanced meal. * Recall all three main food groups and match foods to them. * Explain what is meant by a balanced diet, and recall what happens if your diet isn’t balanced.   Exercise and Fitness   * Recall why exercise is important in everyday language. * Demonstrate how to read pulse rate. * Explain how pulse rate is a measure of fitness. * production or cause increased egg production. Recall that this is used in ‘fertility drugs’ and contraceptive pills.   TDA  One of:   * Investigate the effect of exercise on pulse rate * Compare the speed of the catching reflex of two people * Compare the energy released by burning a ‘low fat’ crisp with a normal one * Use pre-inolculated agar in petri dishes to evaluate the effect of disinfectants and antibiotics   Drugs   * Recall a type of medicine/medical drug and what sort of symptoms you would use it to treat. * Recall at least two reasons why medical drugs need to be tested before being used to relieve illness or disease. * Recall one way in which medical drugs are tested before being used to relieve illness or disease. * Recall some of the effects that drugs have on your body using everyday language. * Sort the names of drugs into legal and illegal groups. * Recall what it means to be a drug addict. | |  | MLD  Immune System   * Recall the names of two types of disease causing microbe. * Give a reason why sometimes bacteria & viruses can make you ill. * Give advice about how to stop spreading disease-causing bacteria & viruses to others. * Recall and name the two different types of blood cell, and recall that they do different jobs. * Describe how a white blood cell defends against bacteria. * Recall that red blood cells transport oxygen around the body. * Recall what antibiotics are used for in everyday language. * Recall that antibiotics kill infective bacteria, but not viruses. * Be able to recall a disease from Outcome 5, and deduce whether it could be treated by antibiotics or not, adding a simple explanation for choice of answer.   Hormones   * Simple recall that your body makes hormones and they help to control your body. * Recall that they move to all parts of the body in the bloodstream. * Be able to name some glands and locate where they are in the body. * Explain some effects of hormones in the body. * Recall that hormones help women to produce eggs. * Recall that there are several hormones involved. * Link the fact that the menstrual cycle has several stages, which results in the release of an egg at a certain time during the cycle to the idea that the amounts of these hormones are not always the same. * Recall that hormones are used in ‘the pill.’ * Recall that hormones produce changes in the body. One of these changes is egg production. * Link that changes in hormone levels can both stop egg | |  |
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| SLD  Reflex Actions   * Recall what reflex actions are like. * Name or sort and demonstrate two reflex actions.   Healthy Diet   * Recall the food you would eat if you were sitting down to a healthy, balanced meal. * Recall all three main food groups and match foods to them. * Explain what is meant by a balanced diet, and recall what happens if your diet isn’t balanced.   Exercise and Fitness   * Recall why exercise is important in everyday language. * Demonstrate how to read pulse rate.   TDA  One of:   * Investigate the effect of exercise on pulse rate * Compare the speed of the catching reflex of two people * Compare the energy released by burning a ‘low fat’ crisp with a normal one | |  | SLD  Drugs   * Recall one reason why medical drugs need to be tested before being used to relieve illness or disease. * Recall one way in which medical drugs are tested before being used to relieve illness or disease. * Recall some of the effects that drugs have on your body using everyday language. * Sort the names of drugs into legal and illegal groups.   Immune System   * Recall the name of one type of disease causing microbe. * Give a reason why sometimes bacteria & viruses can make you ill. * Give advice about how to stop spreading disease-causing bacteria & viruses to others. | |  |

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| Spring 1 | Overview:  Energy Transfer and Efficiency | Ref | Spring 2 | Overview:  Energy Transfer and Efficiency | Ref |
| MLD  Infrared Radiation   * Know that thermal (heat) radiation is called infra red radiation. * Explain that the hotter an object is the faster it will lose energy to the surroundings * Understand the meaning of the terms ‘absorb’ and ‘emit’. * Describe how the nature of the surface determines how good and absorber or emitter it is. * Realise that whether an object emits or absorbs infra red radiation depends on whether it is hotter or colder than its surroundings. * Understand that infra red radiation can be reflected in the same way as light radiation.   Kinetic Theory   * Explain the differences between solids, liquids and gases in terms of the arrangement of particles * Describe how by adding or removing energy, materials can be made to change their state.   Particle Theory   * Be able to identify which method of energy transfer (conduction, radiation, convection, evaporation or condensation is involved in a given situation. * Know that of all these processes, only radiation does not involve particles of matter. * Know that convection can only occur in liquids or gases.   Evaporation and Condensation   * Identify variables that affect the rate of evaporation and condensation, i.e.   + temperature   + wind   + surface area   Energy Transfer   * Recall factors that affect the rate at which an object transfers energy by heating. * State that the hotter an object is, the faster it will transfer thermal energy to the surroundings. | |  | MLD  TDA  One of:   * Investigate which cools more quickly, tea in a white cup or tea in a black cup * Investigate the rate at which water cools * Investigate which is the better material for a saucepan handle – metal or plastic * Investigate different materials that could be used for lagging * Investigate rates of evaporation from water-soaked cloth of different areas   Heating and Insulation   * Identify different ways of insulating buildings, e.g.:   + fibre glass insulation for roofs   + foam insulation for cavity walls   + carpet and underlay for floors   + draught excluders for gaps * Recall that the lower the U-value of a material, the better it is at insulating.   Wasted Energy   * Understand that not all of the input energy in a situation is transferred into the intended place or becomes the intended type of energy. * Explain that wasted energy often goes into warming up the surroundings. * Realise that as the energy becomes more spread out in the surroundings it becomes more difficult to use and so less useful   Efficiency   * Explain that efficient devices are those that change more of the input energy into the intended, useful form of energy. | |  |
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| SLD  Infrared Radiation   * Know that thermal (heat) radiation is called infra red radiation. * Explain that the hotter an object is the faster it will lose energy to the surroundings * Understand the meaning of the terms ‘absorb’ and ‘emit’.   Kinetic Theory   * Explain the differences between solids, liquids and gases in terms of the arrangement of particles   Evaporation and Condensation   * Identify variables that affect the rate of evaporation and condensation, i.e.   + temperature   + wind   + surface area   Energy Transfer   * Recall factors that affect the rate at which an object transfers energy by heating. * State that the hotter an object is, the faster it will transfer thermal energy to the surroundings. | |  | SLD  TDA  One of:   * Investigate which cools more quickly, tea in a white cup or tea in a black cup * Investigate the rate at which water cools * Investigate rates of evaporation from water-soaked cloth of different areas   Heating and Insulation   * Identify different ways of insulating buildings, e.g.:   + fibre glass insulation for roofs   + foam insulation for cavity walls   + carpet and underlay for floors   + draught excluders for gaps * Recall that the lower the U-value of a material, the better it is at insulating. | |  |

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| Summer 1 | Overview: |  |
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