Pioneer Federation
Medium term plan
UKS2- Cycle 1 Term 2
Science

Subject: Science	
Key Concept/ Theme: ● To know that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. ● To know that living things produce offspring of the same kind, but not always identical to their parents. ● To know how animals and plants are adapted to suit their environment in different ways and may lead to adaptation may lead to evolution.	
Prior Learning links: Building on what they learned about fossils in the topic on rocks in year 3, pupils should find out more about how living things on earth have changed over time.	
Vocabulary: ● Evolution, evolve ● Natural selection ● Survival ● Reproduction ● Offspring, parents, siblings ● Environment ● Variation ● Fossils; ammonites, belemnites, micrasters, etc	
1.	**Prior learning reconnection (year group, cycle & term):** Cycle 2, LKS1, Term 3- Rocks and Soils Describe in simple terms how fossils are formed when things that have lived are trapped within rock **LO:** Let's learn what plant adaption is **Plant adaption:** Recap: What do you already know about evolution, adaptation and inheritance? On your sheet, complete a spider diagram around the three words. Can you make any links? Can you think of any synonyms or antonyms? Don't worry if you're not sure what the words mean. We will be learning about them throughout our topic. We will add to this sheet regularly to show our learning! **Deep thinking time – How are plants suited to, and adapted to their environment?** Establish again with the children the fact that all living things are trying to survive. All the living things that can find in the school grounds are success stories: not only have they survived, but millions of their ancestors have too.

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	Encourage the children to think about what a plant needs in order to survive. Adaption: Adaptation is when a plant or animal has changed in some way, over a long period of time, to be better suited to the environment in which they live. Some plants have adaptations too. Water lilies grow on the surface of ponds. They have large leaves that help them to float on top of the water. The large leaves also mean that they can absorb as much sunlight as they can. The leaves have a waxy layer which helps them stay dry and prevent them from sinking. Cacti grow in the desert which is hot and sandy. They have spines instead of leaves to protect them from being eaten by predators. They have large, thick stems which allow them to store water until they need it. They have a thick, waxy skin which helps reduce the amount of water they lose. They have shallow, widespread roots which allows fast absorption of water when it rains. Task: to identify how plants have adapted to different environments- start with cactus adaptions to be in the desert, could they look at how other plants have adapted to their environment.
2.	**Reconnection:** What does the word adaption mean? **LO:** Let's learn what animal adaption is **Animal adaption:** Adaption: Adaptation is when a plant or animal has changed in some way, over a long period of time, to be better suited to the environment in which they live. Create some different scenarios for your children. They must decide which features of which of the animals would make them suited to the environment 1. A factory has opened up near to some woods. The factory produces lots of dark smoke that covers the trees. In the trees live two types of moth; a dark one and a light one. 2. A disease has killed all of the plants whose flowers are long funnelled-shaped. There are bees with long tongues and bees with short tongues. 3. A drought has hit the country. Grey wagtails usually hunt for insects by rivers, whereas the pied wagtails use fields as well. Look at animals that have adapted for their environment e.g cheetah, polar bear, giraffe Then watch: https://www.bbc.co.uk/bitesize/topics/zvhhvcw/articles/zxg7y4j Task: choose an animal that has adapted to its environment and research about their adaptions, then make an information leaflet or poster about hoe they have adapted to suit their environment.
3	**Reconnection:** How are ways that animals have adapted to their environments? **LO:** Let's learn about the theory of natural selection **Skill:**

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	Natural Selection: **The Peppered Moth** The Peppered Moth can be found all around Britain and Ireland. You may see them in your gardens, but its amazing story has made it famous all over the world. An incredible scientist named Darwin discovered something about this particular moth and so it is often referred to as 'Darwin's moth'. Peppered Moths are normally white with black speckles across the wings, which is why they are called 'Peppered Moths'. Their pattern means that they are well camouflaged when they rest on lichen-covered trees during the day. However, in the 19th century, there were lots of factories and coal fires which were causing the air to become sooty. The sooty air deposited onto the trees, covering them in a black layer. This meant the light coloured peppered moths were no longer camouflaged on the trees they liked to sit on. More and more light coloured moths were being eaten by predators such as birds. Because of this, dark coloured moths became more common as they were the ones who could not be seen against the soot covered trees. This is called natural selection. **Natural Selection and Evolution** Natural selection is when organisms that are best suited to their environment survive and pass on their genetic traits. At the same time, organisms that are less likely to survive tend to be eliminated from the ecosystem. The fittest, most adapted organisms survive and multiply whilst the least adapted die out. This was shown with the moths. The light coloured moths were no longer adapted to their environment so started to die out. Whilst dark coloured moths were adapted to the environment so multiplied. Natural selection is key to explaining evolution. Evolution is a theory that states that all species that exist today developed from previous species. For example, some scientists believe that humans evolved from apes! https://www.bbc.co.uk/bitesize/topics/zvhhvcw/articles/z9qs4qt Task: Imagine all the trees changed again. Can you design a moth's pattern which would camouflage it if all trees looked like the picture?
4	**Reconnection:** What does natural selection mean? **LO:** Let's investigate 'Which beak is better adapted to pick up each seed?' **Enquiry skill:** presenting results **Activity:** **Investigation:** **Charles Darwin:** When Darwin was younger, he went on a research voyage to the Galapagos Islands. When he was there, he studied a particular type of bird called a finch. It is believed by scientists that some finches were blown over from the mainland to the islands many years ago. The distance between the islands was too far for the birds to travel so they lived and multiplied on different islands. Each island had different seeds available for the finches to eat. Darwin observed that the finches were identical to each other and to those on the mainland except that they had adapted their beaks to be able to eat the food available on their island. This adaptation happened over many years. Darwin believed the finches had evolved.

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Different Finches

These are some of the different types of finches that Darwin studies: Show pictures of birds

Large ground finch

The large ground finch has evolved a large broad beak to feed on hard seeds and nuts. It forages for food on the ground or in bushes and trees.

Small ground finch

The small ground finch has evolved a small broad beak to feed on soft seeds and nuts. It has been known to eat other food such as flowers, leaves and small insects. It forages for food on the ground or in low shrubbery.

Sharp Beaked finch

The sharp beaked finch has evolved a beak which is short and sharp to feed off the blood of other birds. This finch will jump on the back of birds and suck their blood. This is a unique feeding habit among birds so much so that this finch has been given the nickname 'vampire finch'.

What do you notice about their beaks?

When Darwin returned from his voyage, he wrote about his findings in a book called 'On the Origin of Species'. It has been suggested that Darwin's research on the finches was key to developing the theory of evolution. The Galapagos finches helped to confirm Darwin's idea of natural selection whereby the organisms most adapted to their environment are the most likely to survive.

In Britain, the importance of Darwin's research and his development of the theory of evolution is recognised at the highest level of our Government. So, in 2000, Charles Darwin was printed onto the back of all £10 notes, along with a picture of the boat he travelled on, a magnifying glass and flowers he saw on the Galapagos Islands.

Investigation time

Which beak is better adapted to pick up each seed?

On your tables, you have three different types of 'beak' and 3 different types of 'seed'. You will time how many seeds you can pick up with each beak within a set time. The more seeds you pick up, the better that beak is adapted to pick up that seed. Remember, different beaks might be better at picking up different seeds.

How could we record our findings?

In your group, discuss the best method to use to record your results. Think about what your variables are and what actually needs to be recorded.

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5	**Reconnection:** Who was Charles Darwin? **LO:** Let's learn about inheritance and offspring **Inheritance:** **Cells, Chromosomes, DNA and Genes** While you will not be examining these in detail, it is helpful to know about the building blocks of life for this unit. Cells are the building blocks of all living things. All living things are made up of cells. Amoebas have one cell. Humans have trillions of cells! The nucleus of a cell contains chromosomes, which are made up of DNA. DNA carries the characteristics that we inherit. It is located in two places in the cell: the nucleus and the mitochondria. DNA can replicate and make copies of itself. When cells divide, each cell needs to have an exact copy of the DNA in the old cell. Genes are short sections of DNA that contain specific information. This is often called the genetic code. All the genes in the whole cell are called the genome. **Variation** What does variation mean? What causes variation? **Inheritance** When we talk about inheritance, we often mean things that are passed on to us when one of our relatives or friends has died. Inherited items are sometimes houses or important objects. In science, inheritance refers to the genes that are passed on from biological parents to offspring. When we refer to inherited characteristics we tend to focus on physical characteristics as these are easy to spot but inherited characteristics include abilities such as taste and smell. Task: discuss the difference between inheritated characteristics and acquired characteristics
6	**Reconnection:** What does the term inheritance mean, in the world of Science? **LO:** Let's learn how fossils reveal evidence for evolution **Fossils:** **Darwin and Fossils Tree of Life** Darwin believed that there was a single point of origin for all living things and that we then evolved into the living things that we are today through a process of adaptation Based on his observations and his own fossil finds, he realised that many of the varieties and species of living things simply would not have fossilised or would have been destroyed. Because of the issues related to fossilisation, he did not think it would be possible to find all the 'transitional forms' (i.e. common ancestors) between two living species. **Examining Fossil Evidence** Since Darwin's time, we have continued to find fossils that have proven his theory, including some of the transitional forms. This is now supplemented by the findings of geneticists who can examine the DNA of living things to detect similarities and differences. When examining fossil evidence it is necessary to look for both the similarities and differences in terms of traits. When looking at fossils alone, however, it is not always possible to detect if the traits began as inherited or adaptive traits. In order to understand this we need more information about the environment and other related living things.

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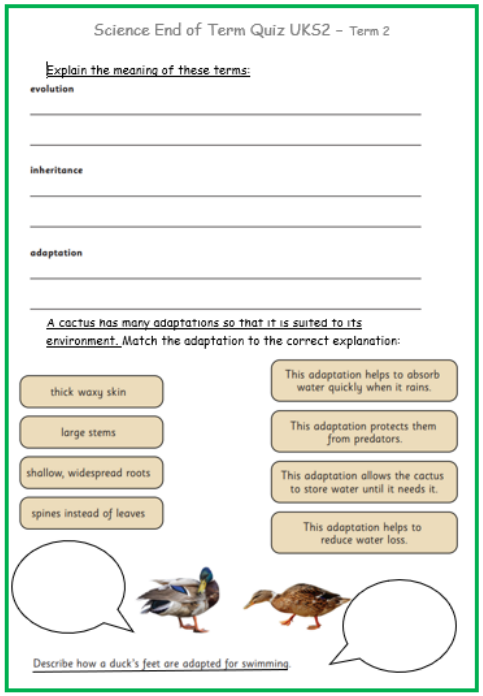
	Fossil Records We know that the majority of fossils are found in sedimentary rocks. The lava that forms igneous rock would not enable fossilisation to take place. Fossils in metamorphic rocks that used to be sedimentary rocks are rare, as the magma heats the rock and will distort the fossils embedded within it. Also there were periods where greater fossilisation of living things occurred than at other times. Many varieties and species of living things have no fossil record and therefore scientists have to work with the fossils they do have. The most complete fossil records are of animals with endo or exoskeletons as the calcium in the bones does not decay as quickly as other matter that makes up living things. For this reason, many living things, such as soft bodied animals and most types of plants, have very incomplete records and fossil finds are very rare. Not all animals with endo and exoskeletons have complete fossil records. Task: look at photographs of fossils and the living relative, how have they evolved, what do you notice about the similarities and differences?
7	**Quiz/assessment**  Science End of Term Quiz UKS2 – Term 2 Explain the meaning of these terms: evolution inheritance adaptation A cactus has many adaptations so that it is suited to its environment. Match the adaptation to the correct explanation: thick waxy skin large stems shallow, widespread roots spines instead of leaves This adaptation helps to absorb water quickly when it rains. This adaptation protects them from predators. This adaptation allows the cactus to store water until it needs it. This adaptation helps to reduce water loss. Describe how a duck's feet are adapted for swimming.

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End points:

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.

Future learning links:

KS3- Biology

Genetics and evolution

Inheritance, chromosomes, DNA and genes

- heredity as the process by which genetic information is transmitted from one generation to the next
- a simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model
- differences between species
- the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation
- the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection
- changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction
- the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.