

Moss Valley's Science Common Misconceptions



This document serves as a comprehensive map of common misconceptions that students often encounter in their learning journey. By looking out for and addressing these misconceptions, teachers are equipped with a powerful tool to enhance their teaching effectiveness.

Animals Including Humans

Year 1	<p>Children can use different names for the same part of the body. For example, the area between the chest and hips can be called the stomach, tummy or belly.</p> <p>Children may think age determines size.</p> <p>Children may not have experienced true darkness and, therefore, think humans can see in the dark.</p> <p>Some children may think that sight is not affected when one eye is covered.</p> <p>Children may think that they can only hear one sound at once.</p> <p>Children may not recognise that some people cannot hear or have different levels of what they can hear.</p> <p>Children may think that the hand is the only body part that can sense touch.</p> <p>Children may not recognise that there are a range of different smells</p> <p>Children may think, for example, that a mouse and an elephant cannot belong to the mammals category due to their distinct physical differences.</p> <p>Children may assume all mammals can be kept as pets and not live in the wild.</p> <p>Children may think all birds can fly. Children may think fur and feathers are the same thing, as they both feel soft. • Children may think all animals with wings are birds.</p> <p>Children may use the term "fish" to describe all animals that live in water.</p> <p>Children may think that fish do not breathe as they are underwater.</p> <p>Children may think that amphibians have scales like fish</p> <p>Children may think that all reptiles are small.</p> <p>Children may think that all reptiles live on land. Discuss examples of aquatic reptiles, such as crocodiles or turtles,</p> <p>Children may think that only mammals can be carnivores. Sorting carnivores into their different animal groups will address this misconception.</p> <p>Children may assume carnivores can only be large animals.</p> <p>Children may assume large animals, such as elephants, eat other animals</p> <p>Children may assume animals of the same type (for example, birds) all have the same diet</p>
Year 2	<p>Children may think that all mammals live on land. Discuss whales and dolphins to help address this misconception</p> <p>Children may use the term "fish" to describe all animals that live in water.</p> <p>Children may think that fish do not breathe because they live underwater.</p> <p>Children may think that all reptiles are small.</p> <p>Children may think that reptiles do not live in the United Kingdom.</p> <p>Children may sort and group animals based on physical features rather than their needs for survival</p> <p>Children may believe that bones in the body do not have specific names, for example, they may think all bones in the leg are called "leg bones".</p> <p>Children may think that the arms and legs have one long bone, rather than multiple bones.</p> <p>Children may find the concept of germs difficult to understand as germs cannot be seen without a microscope. Use a substance to represent germs to show how easily they can be spread.</p> <p>Children may think that washing their hands with water alone is enough to remove germs.</p> <p>Children may think that their teeth only fall out if they are decaying. Baby teeth fall out naturally and are replaced with adult teeth.</p>
Year 3	<p>Children may think that the skeleton is one large bone, rather than lots of bones.</p> <p>Children may believe that bones in the body do not have specific names, for example, they may think all bones in the leg are called "leg bones".</p> <p>Children may think that the arms and legs have one long bone, rather than multiple bones.</p> <p>Children may believe that all bones must protect an internal organ, like the skull and ribcage do.</p> <p>Children may think that all bones have the same function.</p> <p>Children may think that humans are not mammals and that other mammals have a different skeletal system to humans.</p> <p>Children may think that if an animal does not have a spine, then it cannot move.</p> <p>Children may believe that all animals without a spine have no form of skeleton.</p> <p>Children may think that all animals without a spine have an exoskeleton.</p> <p>When looking at specific groups, children may think that all animals within that group have the same skeletal structure. For example, snakes and lizards are both classified as reptiles but have very different skeletons. Another example of this could be humans and whales.</p> <p>Children may think that all food has the same nutritional benefits for the body.</p> <p>Children may think that drinks have no impact on a healthy/balanced diet.</p>

	<p>Children may use their personal preferences to sort food based on whether it should be eaten regularly, sometimes or occasionally</p> <p>Children may think that adults who follow a vegan or vegetarian diet cannot get any protein within their diet.</p> <p>Children may believe that all food groups need to be eaten in equal amounts and may design a meal that is not nutritionally balanced. Children may incorrectly classify food in their meal. For example, they may state that potatoes are their source of vegetables, rather than a source of carbohydrates.</p>
<p>Year 4</p>	<p>Children may incorrectly group worms and spiders as insects. They are classified in a different category of invertebrate.</p> <p>Children may think that all invertebrates have an exoskeleton.</p> <p>Children may create questions that are too broad and therefore do not help to classify.</p> <p>Some children may think that only the fruit that they eat are fruits.</p> <p>Children may think that all animals have similar teeth.</p> <p>Children should be reminded that adult teeth are not replaced, and enamel does not regrow.</p> <p>Children should understand that they will not see the effects on the eggshell straightaway, but they should observe a change over time. • Children may point out that the egg is not the same as a tooth. Explain that the material of eggshells is similar to that of human teeth.</p> <p>When demonstrating the digestion model, it is difficult to separate the small and large intestine. Ensure children are aware that these are two different organs in the digestive system.</p>
<p>Year 5</p>	<p>Children often think that a foetus grows in the mother's stomach rather than in the womb. • Children may think a baby and a foetus are the same thing.</p> <ul style="list-style-type: none"> • Children may think that all babies hit milestones at exactly the same time. <p>Children may think that all babies are the same length and mass when they are born.</p> <p>Children may think that puberty begins at the same age for every person. Explain to children that it usually happens between the ages of 8 and 16. On average, girls start puberty two years before boys. • Children may think that all physical changes happen quickly.</p> <p>Children should be aware that puberty is a gradual process that happens over several years.</p> <p>Children may think that all humans have the same life expectancy. Explain that life expectancy varies among humans for many different reasons such as health, sex and where you live.</p> <p>Children may think that all humans experience the same physical changes at the same time as they age. Explain that a variety of factors can influence this, such as exercise and keeping your brain active.</p> <p>Children may think that there is no correlation between the length of an animal's gestation period and its lifespan. Usually, the longer the gestation period of an animal, the longer the lifespan</p>
<p>Year 6</p>	<p>Children may think that life begins once a baby is born.</p> <p>Children may think that a foetus grows in the mother's stomach rather than the womb.</p> <p>Children may think that the circulatory system is one thing, rather than different parts working together.</p> <p>Children may confuse arteries, veins and capillaries.</p> <p>Children may think that blood is only made up of red blood cells, because it is red.</p> <p>Because children cannot control their heart, they may not realise it is a muscle.</p> <p>Children may think that the heart is one solid or empty vessel, rather than split into four different chambers.</p> <p>Children may think that because deoxygenated blood travels to the heart, that is where it becomes oxygenated.</p> <p>Children may think that deoxygenated blood is blue.</p> <p>Children may be confused about which sides of the heart we call the left and right sides.</p> <p>Children may not understand the significance of the left side of the heart being thicker than the right side.</p>

Living thing and their habitat

Year 2	<p>Children may think that it is only animals that have a habitat. Explain to children that plants also have a habitat which provides everything they need to survive.</p> <p>Children may think that plants will not grow in polar habitats.</p> <p>Children may think that it is always hot in the desert. Explain that at night, the desert can be extremely cold too.</p> <p>Children may think that no plants and animals can survive in the desert due to the heat and lack of water.</p> <p>Children may think that a particular animal only has one habitat. For example, a fox can be found in a woodland habitat but it can also inhabit an urban area.</p> <p>Children may think that all animals live in the same microhabitats.</p> <p>Children may think that all carnivores/herbivores/ omnivores eat the same diet and not consider the food available in their habitats.</p> <p>Children may not realise that energy is passed within a food chain.</p> <p>Children may not draw arrows the right way round to show the passing of energy on their food chains.</p>
Year 4	<p>Children may struggle to use closed questions. They may base their questions upon opinion, or ask questions that are too broad or narrow.</p> <p>Plants can be harder to classify than animals because children may think that plants all have similar features.</p> <p>Children may only be familiar with the negative ways that humans affect the environment. Point out some of the positive ways that humans have affected habitats, and how children can make a difference in their local area.</p>
Year 5	<ul style="list-style-type: none">• Children may think that humans are not animals and therefore are not classed as mammals.• Children may think frog eggs (frogspawn) have a hard outer covering like bird eggs. <p>Children may incorrectly classify spiders as insects. Spiders are classified as arachnids because they have eight legs and two body sections. Children do not need to be introduced to the term "arachnids" in Year 5 as this is introduced within the Year 6 curriculum.</p> <p>Some children may think that eggs hatch into fully formed birds.</p> <p>Children may think that all birds build nests in trees.</p> <p>Children may not realise that most flowering plants have both male and female reproductive parts.</p> <p>Children may think that reproduction must involve two parents. Explain that asexual reproduction involves just one parent. • Some plants, such as daffodils, can reproduce both asexually from bulb division and sexually from the flowers.</p>
Year 6	<p>Children may think that animals move and plants do not. It is important to explain to them that parts of a plant do move towards sunlight.</p> <p>Children may think that all plants have flowers. Remind them that some plants are non-flowering.</p> <p>Children may think that all bacteria are harmful. State to them that humans have bacteria inside them which help to digest food. • Children may believe that all microorganisms can be seen with the eye. Clarify to them that a powerful microscope is needed to view them.</p> <p>Children may think that microorganisms cannot be classified. Clarify that microorganisms can be classified based on their features, just as animals and plants can.</p> <ul style="list-style-type: none">• Children may think that Linnaeus created the classification system that we have today. • Children may think that Linnaeus only classified animals. He created a classification system for plants also.

Plants

Year 1	<p>Children may make incorrect generalisations, for example that all flowers are yellow.</p> <p>Children may not understand that most roots grow underground.</p> <p>Children may think that plants are small and trees are tall. Show them a range of trees to address this misconception.</p> <p>Children may think that trees die in winter</p> <p>Children may believe that any tree with green leaves is an “evergreen” tree.</p> <p>Children need to recognise that a tree cannot change between “evergreen” and “not evergreen”</p>
Year 2	<p>Children may have preconceived ideas about what a plant is. They may not classify fruit, vegetables or herbs as plants.</p> <p>Children may have preconceived ideas about fruit based on the fruit they eat regularly.</p> <p>Children may think that all seeds grow into the same plants. grow into.</p> <p>Children may think that the seed consumes the soil to begin it's life cycle.</p> <p>Children may think that plants do not need any light at all to grow.</p> <p>Children may think that all plants need the same amount of light.</p> <p>Children may think that plant growth will happen over a short period of time, such as overnight.</p>
Year 3	<p>Children may think plants get their food from the soil or that plants eat food like animals do. Explain to them that green plants make their own food from sunlight.</p> <p>Children may think that the flowers do not have a specific function for the plant. Clarify to them that the flowers play an important role in helping plants to reproduce and create new life.</p> <p>Children may think that the stems, leaves and flowers of different plants all look the same</p> <p>Children may think that the roots “suck” in the water. Clarify to them that the roots absorb the water.</p> <p>Children may think that plants take in water from the leaves or the flowers. Explain that the roots absorb water from the soil, which then travels to the stem.</p> <p>Children may think that a seed and a seedling are the same thing.</p> <p>Children may think that bees are the only pollinators. Explain that other animals, such as butterflies, hummingbirds and bats, are also pollinators.</p> <p>Children may think that flowers can only be pollinated by animals. Pollination can also occur when wind carries the pollen from the stamen to the pistil.</p> <p>Children may believe that only animals, including humans, go through a life cycle. Explain to children that as plants are living things, they also go through a life cycle. • Some children may think that the life cycles of all plants take the same amount of time.</p>
Year 5	<p>Children may not realise that most flowering plants have both male and female reproductive parts.</p> <p>Children may think that reproduction must involve two parents. Explain that asexual reproduction involves just one parent. • Some plants, such as daffodils, can reproduce both asexually from bulb division and sexually from the flowers.</p>

Materials and their properties

Year 1	<p>Children may think that materials can only be sorted in one way.</p> <p>Children may focus on sorting based on the material only. Encourage children to think about other categories for sorting, such as texture, size or mass.</p> <p>Children may think that all rocks have the same properties, such as colour or texture. Show children a range of examples of rocks to address this misconception.</p> <p>Some children may not realise that rocks can be shaped and used as a material in everyday life, such as in buildings.</p> <p>Children may not be able to tell the difference between an object and the material it is made from.</p> <p>Some children may think certain objects are always made from the same material, for example, all spoons are made from metal.</p> <p>Children may think the larger an object is, the more likely it is to sink.</p> <p>Children may think that if the water is absorbed by the material, then it has disappeared. Show them that the water can be removed by squeezing the absorbent material.</p>
Year 2	<p>Children may think that all materials are human-made. Show examples of common natural materials such as wood, wool and sand.</p> <p>Children may think that all paper has the same thickness and texture.</p> <p>Children may think that all rocks are heavy. Children may think that all rocks are hard and cannot be broken easily.</p> <p>Children may think that rocks and stones are different materials. Explain to children that stone is a word used to describe smaller rocks.</p> <p>Children may think all plastic is hard.</p> <p>Children may think that all metals are silver in colour. An easy way to avoid this misconception is to allow children to explore different coins.</p> <p>Children may think that natural fabrics, such as wool and cotton, are not fabrics.</p> <p>Children may think that objects can only be made from one material. Show them three water bottles – plastic, glass and metal</p> <p>Children may think that all solid materials are hard.</p> <p>Children may think that all solid materials are heavy.</p> <p>Children may think that if a solid material changes shape, it cannot change back to its original shape.</p>
Year 5	<p>Children may think that all metals are magnetic</p> <p>Children may think that only metals are conductors of electricity.</p> <p>Children may think that insulators are only used to keep things warm. They can also keep things cold.</p> <p>Children may think that an object can only be made from one material. Show examples of objects that are made from a mixture of multiple materials and discuss their suitability for purpose.</p> <p>Children may think that all metals are rigid. Aluminium foil is a familiar material that can be used to show children that some metals can change shape easily.</p> <p>Children may think that all metals are heavy.</p>

Electricity

Year 4	<p>Children may find it difficult to understand that appliances that are plugged into the mains and appliances that use batteries both operate using electricity.</p> <p>Children may not be aware of the dangers of electricity as it is not visible.</p> <p>Children may not identify that a circuit will not work if the switch is open</p>
Year 6	<p>Children may draw pictorial representations of circuit components rather than symbols when drawing circuits.</p> <p>When drawing circuits, children may think that wires should be drawn as “wiggly” lines.</p> <p>Children may believe that when a circuit is incomplete, the electricity, or current, disappears or escapes from the circuit. Explain that a current does not flow at all in incomplete circuits and does not disappear or escape.</p> <p>Children may think that if all the components are in place, then the circuit is complete. Explain that even if all the components are in place, if the switch is open then the circuit is incomplete.</p>

Earth & Space

Year 5

Children may think that there is more than one star in the Solar System. Clarify that the only star in the Solar System is the Sun.
Children may think that Pluto is a planet. Explain that Pluto was reclassified as a dwarf planet because it is not big enough to be regarded as a planet.
Children may believe that Earth is larger than the Sun.
Children may think that all planets have a hard rocky surface like Earth.
Children may believe that Earth is the only planet with a moon. Earth has one moon but several other planets have more than one moon. For example, Uranus has 28 known moons.
Children may believe that all planets are the same size.
Children may think that all planets are the same distance from the Sun.
Children may believe that the Sun is the same size as the planets.
Children may believe that it takes every planet about 365 days to orbit the Sun.
Children may believe that the planets cannot be seen without a telescope.
Children may believe that Earth is flat. Explain that people once thought this, but now we know that Earth is spherical.
Children may think that Earth is at the centre of the Solar System
Children may believe that the Sun rotates around the Earth.
Children may think that Earth is the largest object in the Solar System, not the Sun.
Children may think that other planets can support life.
Children may think that the Sun disappears at night.
Children may believe that night and day are caused by the Sun moving around Earth.

Forces and Magnets

Year 3

Children may believe that only one force can act on an object at once.
As children cannot see forces, they may find it difficult to understand their effects.
Children may believe that a stationary object does not have any forces acting on it. Explain to them that friction can prevent an object from moving.
The height of the ramp and the way the car is released can affect the distance that the car travels. Before the investigation, decide the most suitable height of the ramp and the most appropriate measuring equipment to use.
Encourage children to release the car at the top of the ramp rather than pushing it as this will affect the results of their investigation.
Children may find magnets and magnetic forces difficult to understand as magnetic forces cannot be seen.
Children may find it difficult to understand that disc and ring magnets also have north and south poles
Children may conclude that all metals are magnetic
Children may think that all coins are magnetic. Clarify to them that depending on their composition, some coins are magnetic and other coins are non-magnetic. Since January 2012 the compositions of 5p and 10p coins have been made from a plated steel, making them magnetic.
Children may think magnets have to be the same type to attract each other, for example two bar magnets.

Year 5

Children may think friction only occurs when two surfaces are moving. Clarify that friction occurs even when the two surfaces are not moving. They may think that friction only occurs between rough surfaces.
Children might think that it is wind acting on the parachute that slows it down rather than air resistance.

Light & Sound

Year 3	<p>As we see with our eyes, children may think that our eyes produce light, rather than light is reflected into our eyes allowing us to see.</p> <p>Children may think that the Moon is a source of light as it can be seen in the night sky.</p> <p>Children may only recognise sunburn as a harmful effect of the Sun.</p> <p>Children may think that only shiny, smooth surfaces reflect light.</p> <p>Children may think a shadow is a reflection of the Sun.</p> <p>Children may think a shadow can only be created by the Sun rather than by other light sources.</p> <p>Children may think that all materials cast shadows.</p> <p>Children may think that translucent objects would cast clear, defined shadows because they are not completely transparent.</p>
Year 4	<p>Children may think that sound only travels through air.</p> <p>Children may find it difficult to understand how vibrations are detected by the ear.</p> <p>Children may find it difficult to make the link between the strength of the vibrations and the volume of a sound.</p> <p>Children may think that the pitch of an instrument can only be changed in one way. Demonstrate to children that it can be changed in different ways using lengthening/shortening strings or using more or fewer fingers on holes in the instrument.</p>
Year 6	<p>Some children may think that light is emitted from our eyes. Explain that objects can be seen when the light from the object enters our eyes.</p> <p>Children may initially believe that we can only see objects that emit light, such as the Sun or a light bulb. Explain that not all objects emit light themselves. Instead, we can see objects that reflect light into our eyes.</p> <p>•Children may think that shadows are always the same size. The shape and size of the shadow formed depend on the size of the object blocking the light and the angle of the light source.</p> <p>Children may become confused as to why light refracts. Clarify to them that light can change direction when it travels from one medium to another. • Children may think the processes of refraction and reflection are the same.</p>

Solids, Liquids and gases

Year 4	<p>Children may think that solid materials cannot change shape. Some solid materials can be squashed, bent, twisted or stretched.</p> <p>Children may think that the volume of a liquid changes when it is poured into different containers.</p> <p>Children may think that all solid materials are heavy.</p> <p>Children may think that it is only liquids that can be poured. Some solids, such as sand, sugar and rice, are solid materials that can be poured.</p> <p>Children may think that when a liquid flows slower than water, it is not a liquid. Oil and syrup are liquids that flow slower than water.</p> <p>Children may confuse boiling and evaporation. They may think that evaporation can occur only when water boils at 100°C.</p> <p>Children may think that once a material has melted it cannot turn back to a solid.</p> <p>Children may think that the Sun absorbs water.</p> <p>Children may think that clouds are a gas (water vapour) and not water/ice droplets in the atmosphere. It is the water that makes clouds visible.</p>
Year 5	<p>Children may think that when a substance dissolves in water it disappears. However, soluble substances are added to liquids to make a solution.</p> <p>Children may confuse dissolving with melting. When a substance dissolves, the solid is added to the liquid to make a solution, as opposed to melting, which is when a solid changes state to a liquid.</p> <p>Children may think that filtering and sieving are the same thing. Completing simple tests will help children to notice the differences.</p> <p>Children may think that soluble substances can be separated by sieving or filtering. Solutions will just pass through the sieve or filter paper.</p> <p>Children may think that the liquid disappears when it evaporates.</p> <p>Children may think that all changes are reversible.</p>

Evolution

Year 6

Some children may think that only animals such as humans, dogs and cats show variation. Clarify to them that organisms such as plants and microorganisms also show variation.

Children may think that they are identical to one of their parents if they look similar. Explain to children that organisms that are produced through sexual reproduction make non-identical offspring.

Some children may believe that humans do not inherit hair colour from their parents, because we can dye our hair to change its colour. Clarify to them that the natural colour of human hair is inherited from our parents.

In this step we are discussing biological families. Different children have different families. This topic is sensitive and knowledge of your children's family situations is beneficial.

Children may think that animal adaptations such as camouflage occur because the animal has "chosen" to camouflage itself. State to them that the animal cannot "choose" this.

Children may think that animals are able to adapt within their own lifetime.

Children may believe that a camel's hump stores water. The hump contains fat, which can break down to release energy and water.

Children may think that cacti just have "spikes" and not leaves. Explain to them that cacti have spines or needles, which are a type of leaf, designed to reduce water loss.

Children may believe that plants in deserts have the same size or length of roots as plants in a rainforest.

Clarify that desert plants may have extremely long roots to help them absorb water.

Children may think that evolution is a quick process.

Children may believe that evolution causes animals and plants to be perfectly adapted to their environments. Explain that evolution causes animals and plants to be better adapted to their habitats.

Children may think only animals have evolved adaptations to their environments. Clarify that evolution happens in all organisms.

Children may think that plants and animals choose to adapt to their environments or habitats by natural selection. Highlight to them that the plants and animals do not choose to adapt.

Children may think that evolution and natural selection is the same thing.

Clarify that this is not the case and that natural selection is a cause of evolution.

Children may believe that all prehistoric animals are extinct because all that remains of them are fossils. However, some reptiles and birds alive today share common ancestors with prehistoric animals.

Children may think that fossils are the actual animals or plants rather than an ancient cast or mold of them.

Children may think there is no link between fossils and evolution. Fossils can be found in older and newer rocks with physical similarities. This suggests that animals have changed or evolved over time.