

Vertical concepts

Big ideas of science



	1. All material in the universe is made of very small particles	2. Objects can affect each other at a distance	3. Changing the movement of an object requires a net force to be acting on it
EYFS	<ul style="list-style-type: none"> The same substance (water) can look different when it is hot or cold (ice) 	<ul style="list-style-type: none"> Magnets can attract or repel other magnets Magnets attract magnetic objects 	<ul style="list-style-type: none"> We can push and pull objects to make them move
Y1			
Y2	<ul style="list-style-type: none"> All the 'stuff' encountered in everyday life, including air, water and different kinds of solid substances is called matter Different materials are recognisable by their properties 		
Y3		<ul style="list-style-type: none"> Objects can have an affect on other objects even when they are not in contact with them. Light reaches our eyes, even though the light source may be far away The non-contact force of magnetism mean magnets can attract or repel other magnets 	<ul style="list-style-type: none"> Forces can push, pull or twist objects, making them change shape or motion Things can only change their motion if there is a net force acting on them When forces acting on an object are not equal and opposite in direction, they are unbalanced and will change an object's speed, direction or shape
Y4	<ul style="list-style-type: none"> The amount of material does not change when a solid melts or a liquid evaporates If a material could be divided into smaller and smaller pieces it would be found to be made of pieces, particles, smaller than can be seen even with a microscope. These particles are not in a material; they are the material. 	<ul style="list-style-type: none"> Sound comes from things that vibrate and can be detected at a distance from the source because the air or other material around is made to vibrate. Sounds are heard when the vibrations in the air reach our ears 	
Y5	<ul style="list-style-type: none"> When some materials combine, they do not change permanently and can be separated again Materials can be changed by heating and cooling 	<ul style="list-style-type: none"> The non-contact force of gravity makes things fall to Earth There is gravitational force between all objects, but it is only felt when one or more of the objects has a very large mass 	<ul style="list-style-type: none"> An object on Earth pulls the Earth as much as the Earth pulls the object, but because the Earth's mass is much bigger, we observe the motion of the object The downward force of gravity on an object on the Moon is less than that on Earth because the Moon has less mass on Earth
Y6	<ul style="list-style-type: none"> When some materials are combined, they form a new material with different properties to the original materials 		
KS3	<ul style="list-style-type: none"> The smallest piece of a material is called an atom. All materials, anywhere in the universe, living and non-living, are made of a very large numbers of these basic 'building blocks' of which there are about 100 different kind 	<ul style="list-style-type: none"> There is attraction and repulsion between objects that are electrically charged Visible light and other forms of radiation can travel through any empty space 	<ul style="list-style-type: none"> How quickly an object's motion is changed depends on the force acting and the object's mass. The greater the mass of the object, the longer it takes to speed it up or slow it down (inertia)

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	4. The total amount of energy in the Universe is always the same, but energy can be transformed when things change or are made to happen	5. The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate
EYFS	<ul style="list-style-type: none"> We have to push or pull objects to make them move 	<ul style="list-style-type: none"> We experience different types of weather in different seasons
Y1	<ul style="list-style-type: none"> Things around us can be made to change or happen. We can pull objects behind us or push them across the table 	<ul style="list-style-type: none"> Plants grow in soil The weather can change rapidly. Different seasons have different weather patterns
Y2	<ul style="list-style-type: none"> All living things need food to give them energy The arrows in a food chain show where energy is being transferred from and to 	<ul style="list-style-type: none"> There is air all around us on Earth
Y3		<ul style="list-style-type: none"> Much of the solid surface of the Earth is covered in soil, which is a mixture of pieces of rock of various sizes and the remains of organisms. Some soil also contains air, water and some nutrients. There are many different kinds of rock with different composition and properties. Beneath the Earth's solid crust is a hot layer called the mantle. The Earth's crust consists of a number of solid plates which move relative to each other, carried along by movements of the mantle. The formation of mountains, earthquakes and volcanic activity are likely to occur at these cracks (see Geography Year 3 Spring: Mountains and Volcanoes and Year 4 Summer: Earthquakes)
Y4	<ul style="list-style-type: none"> The arrows in a food web show where energy is being transferred from and to Things around us can be made to change or happen. We can turn on a light bulb and make it brighter or dimmer. 	
Y5	<ul style="list-style-type: none"> Many processes and phenomena are explained in terms of energy exchanges Energy cannot be created or destroyed. When energy is transferred from one object to others, the total amount of energy in the universe remains the same; the amount that one object loses is the same as the other objects gain 	<ul style="list-style-type: none"> There is less and less air further away from the Earth's surface; space is a vacuum Light from the Sun warms the Earth's surface and the heat is trapped by the Earth's air. This is known as the greenhouse effect (see Geography, Year 5 Summer: Climate across the world)
Y6	<ul style="list-style-type: none"> Across the world, the demand for energy increases as human populations grow and modern lifestyles require more energy, particularly electrical energy. 	
KS3	<ul style="list-style-type: none"> Objects have energy because of their chemical composition, their movement, their temperature, their position in a gravitational or other field, or because of compression or distortion of an elastic material. 	<ul style="list-style-type: none"> Weather is determined by conditions of the air. The temperature, pressure, direction and speed of the movement and the amount of water vapour in the air combine to create the weather. Radioactive decay of material inside the Earth since it was formed is its internal source of energy.

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	6. Our solar system is a very small part of one of millions of galaxies in our universe	7. Organisms are organised on a cellular basis	8. Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms
EYFS			<ul style="list-style-type: none"> • There is a wide variety of living things, including plants and animals
Y1	<ul style="list-style-type: none"> • Daytime is when the Earth is facing the Sun; nighttime is when the Earth is facing away from the Sun. 	<ul style="list-style-type: none"> • Living things, including humans, react to their surroundings with their senses 	
Y2		<ul style="list-style-type: none"> • Living things grow, need, water, air and food, react to their surroundings, move, get rid of their waste, reproduce 	<ul style="list-style-type: none"> • All living things need energy for food, as well as air, water and certain temperature conditions. • Most plants make their own food • Animals need food, which comes by eating plants (herbivores) or by eating animals (carnivores), which have eaten plants or other animals. • Plants and animals are dependent on each other. • Organisms are adapted to their environment. If conditions in a habitat change, organisms may not be able to survive.
Y3	<ul style="list-style-type: none"> • The Moon reflects light from the Sun. 	<ul style="list-style-type: none"> • Living things need water, air, food, a way of getting rid of water and an environment that stays within a particular temperature range. 	<ul style="list-style-type: none"> • Plants make their own food using sunlight, carbon dioxide and water
Y4			<ul style="list-style-type: none"> • Animals are ultimately dependent on plants for their survival. • The relationships among organisms can be represented as food chains and food webs.
Y5	<ul style="list-style-type: none"> • Our Sun is one of many stars that make up the Universe. • The distances between us and the bodies in solar system is huge, and even bigger in the Universe 		
Y6		<ul style="list-style-type: none"> • Micro-organisms are organisms that are so small that we cannot see them with our eyes alone 	<ul style="list-style-type: none"> • In any given ecosystem there is competition among species for the energy and materials they need to live.
KS3	<ul style="list-style-type: none"> • The tilt of the Earth's axis gives rise to seasons. • The movements of galaxies suggest that the Universe is expanding from a past state called the 'big bang', towards a future that is still unclear 	<ul style="list-style-type: none"> • All organisms are made of one or more cells, which can only be seen through a microscope • All the basic functions of life – growth, reproduction, extracting energy from food – are the results of what happens inside cells • Cells are often aggregated into tissues, tissues into organs, and organs into organ systems 	<ul style="list-style-type: none"> • Decomposers are essential (alongside producers and consumers) for a stable ecosystem.

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	9. Genetic information is passed down from one generation of organisms to another	10. Diversity of organisms, living and extinct, is the result of evolution
EYFS	<ul style="list-style-type: none"> • Young animals grow into adult animals 	<ul style="list-style-type: none"> • There are many different kinds of plants and animals in the world today.
Y1		
Y2	<ul style="list-style-type: none"> • Plants and animals reproduce (have offspring) 	
Y3		<ul style="list-style-type: none"> • Fossils are the preserved remains or traces of living things.
Y4		
Y5	<ul style="list-style-type: none"> • Organisms produce offspring of the same kind, but in many cases offspring are not identical with each other or with their parents. • Plants and animals, including humans, resemble their parents in many features because information is passed from one generation to the next. • Not all information is passed on from one generation to the other in the same way; some skills and behaviour have to be learned 	<ul style="list-style-type: none"> • Although organisms of the same species are very similar, they vary a little from each other.
Y6		<ul style="list-style-type: none"> • There are many kinds of organisms that were once alive but are now extinct. • We know about extinct animals from fossils. • Living things are found in certain environments because they have the features that enable them to survive there. This adaptation to their environment has come about because of the small differences that occur during reproduction, resulting in some individuals being better suited to the environment than others. In the competition for materials and energy, those that are better adapted will survive and are more likely to pass on their adapted feature to their offspring.
KS3	<ul style="list-style-type: none"> • In a human body, most cells contain 23 pairs of chromosomes. These provide information that is needed to make more cells in growth and reproduction. 	<ul style="list-style-type: none"> • The natural selection of organisms has been going since the first form of life appeared on Earth 3.5 billion years ago. • Multi-cellular organisms evolved around 2 billion years ago