Edward Peake CofE Middle School
Science Curriculum Progression

Curriculum Intent:
The science curriculum at Edward Peake has been specifically designed for our pupils to ensure that they not only become confident and enquiring scientists but also are enthralled by the wonders of science and its impact on our lives in the past, present and future. We benefit from four fully equipped science labs which are used by all year groups which allows us to create a curriculum that suits the needs of our pupils.

Our main aims are to:

- **Live:** Ensure pupils develop scientific investigation skills, an enquiring mind and high quality communication skills which they can apply to lifelong learning so that they can make an active contribution to society.
- **Love:** Broaden pupils' horizons by giving them opportunities to explore current environmental, global and scientific issues in order for them to better understand the world they live in.
- **Learn:** Develop independent, confident and successful scientists who achieve the best possible academic standards, whatever their starting point.

Pupils will explore the impact of science for the future. This will be done through our four key concepts that are threaded throughout our science curriculum. These are: **making healthy lifestyle choices, maintaining and building communities, sustainability and jobs for the future.**
The science curriculum at Edward Peake has been designed to meet the aims of our whole school curriculum to ensure that all pupils are able to succeed no matter their starting points and barriers to learning. Our curriculum is designed to be challenging for all pupils but as part of our commitment to equality we will support pupils in accessing this aspirational content. We are also committed to meeting the whole school aims of developing pupils' cultural awareness by exploring a wide range of scientists from across the world and their impact on our lives through their scientific discoveries.

We have made a commitment to support the draft sustainability and climate change strategy for education published by the Department for Education in November 2021. A copy of the draft strategy can be found here: DFE Draft Climate and sustainability document

Skills and Knowledge	Year 5	Year 6	Year 7	Year 8
BIOLOGY Living things and their habitats KS2 Ecosystems KS3	Pupils know: the differences in the life cycles of a mammal, an amphibian, an insect and a bird. the life process of reproduction in some plants and animals. .	Pupils know: how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.	Pupils know: definitions of the terms ecosystem, environment, population, producer and consumer and be able to give examples for each term how to use information from a food web to explain the feeding relationships	Pupils know: the definition of aerobic respiration as being the release of energy from glucose in the presence of oxygen the reactants, products and word equation for respiration the difference between anaerobic respiration in

		how to classifying plants and animals based on specific characteristics.	between organisms in an ecosystem the importance of insects to human food supplies definitions of the terms predator, prey and interdependence the parts of an insect pollinated flower and relate each structure to its function the process of pollination examples of different methods of seed dispersal how plants are adapted to disperse seeds using wind, water or animals	animals, plants and microbes like yeast how to write word equations for anaerobic respiration in animals, plants and microbes that fermentation is the same as anaerobic respiration in yeast the process of photosynthesis and how to write the word equation for photosynthesis why only plants and algae that are green can carry out photosynthesis the role of plant roots and explain how plant roots are adapted to obtain named resources from the soil the names of the tissues that transport materials to and from the plant roots how respiration and photosynthesis are related in plants the uses of the products of photosynthesis and the importance of these to other organisms how the rate of photosynthesis can be affected by changing the external conditions
	Where in the curriculum this is taught: Y5- living things and their habitats. Summer term	Where in the curriculum this is taught: Y6 – Living things and their habitats Summer term	Where in the curriculum this is taught: Y7 Ecosystems Summer term	Where in the curriculum this is taught: Y8 Ecosystems Summer term

BIOLOGY Animals including humans KS2 Organisms KS3	Pupils know: the changes as humans develop to old age.	Pupils know: the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. the impact of diet, exercise, drugs and lifestyle on the way their bodies function. the ways in which nutrients and water are transported within animals, including humans.	Pupils know: that the components of the human skeleton are responsible for protection of organs, support and movement that the bone marrow creates new red and white blood cells how to draw a diagram of an antagonistic muscle joint labelling ligaments, tendons and cartilage and explain the functions of each of the parts the different tissues that are found at a joint how to label a diagram of joint to show the antagonistic muscles, ligaments, tendons and cartilage how to distinguish between unicellular and multicellular organisms that multicellular organisms have different levels of organisation and that their cells are organised into tissues, organs and systems how to use a light microscope to observe a slide of onion or cheek cells how to draw cheek and onion cells from microscope slides and label all visible features	Pupils know: the names of the gases that are exchanged between the alveoli and the blood how to label a diagram of the thorax to show the key parts of the human gas exchange system and know the function of these key parts why the rate of breathing is determined by the volume of oxygen the body needs how the ribs and diaphragm change the volume and pressure inside the thorax during inhalation and exhalation the lung volume for an average person and how to measure lung capacity by displacing a volume of water with exhaled air the factors that can affect the gas exchange system the key components of a balanced diet and use data to calculate the requirements of a healthy diet the key components of the human digestive system and know the function of each the locations of the key components of the digestive system how food is broken down by

			the basic components of a plant and an animal cell. Know the function of the basic components of a plant and an animal cell the key organ systems of the body and describe their main components. the function of the key organ systems of the body	chemical and mechanical digestion the importance of enzymes in the chemical digestion of food
	Where in the curriculum this is taught: Y5 - Animals including humans. Autumn term	Where in the curriculum this is taught: Y6 - Animals including humans. Autumn term	Where in the curriculum this is taught: Y7 – Organisms. Autumn term	Where in the curriculum this is taught: Y8 – Organisms. Autumn term
BIOLOGY Evolution and inheritance KS2 Genes KS3		Pupils know: that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	Pupils know: the definition of the term species that there is variation between individuals of the same species the difference between continuous and discontinuous variation and give examples of each the definition of the term adaptation how variation helps a particular species in a changing environment the key features of the male and female reproductive systems on a diagram and know the functions of these key features.	Pupils know: the definitions of the key terms natural selection, competition, evolution the principles of Darwin's theory of natural selection that organisms have adaptations that help them survive in their environment the term extinction and give examples of organisms which are now extinct the term biodiversity why biodiversity is important in ecosystems and why it is important to maintain biodiversity the importance of DNA, genes and chromosomes in inheritance how to draw a diagram to show the relationship

			the importance of the menstrual cycle in human reproduction key events in a 28 day menstrual cycle in a non-pregnant woman definitions of the terms gestation, foetus, placenta, umbilical cord how to label a diagram showing the main structures associated with the development of a foetus inside the uterus the main stages of the development of a foetus from sex cells to birth that contraception stops a woman getting pregnant and describe a range of different contraceptive devices	between DNA, chromosomes and genes the terms genome, haploid, diploid, allele, homozygous, heterozygous, dominant, recessive the terms mutation and carcinogen the effect of changes in DNA on an organism and its future offspring
	Where in the curriculum this is taught:	Where in the curriculum this is taught: Y6 Evolution. Inheritance and adaptation Spring term	Where in the curriculum this is taught: Yr 7 Genes, Spring term	Where in the curriculum this is taught: Yr 8 Genes, Spring term
CHEMISTRY Earth and Space KS2 Earth KS3	Pupils know: the movement of the Earth, and other planets, relative to the Sun in the solar system the movement of the Moon relative to the Earth the Sun, Earth and Moon as approximately spherical bodies the idea of the Earth's rotation to explain day and		Pupils know: that the three rock layers inside earth are the crust, the mantle and the core that sedimentary rock are formed from layers of sediment, and which can contain fossils that igneous rocks are formed from cooled magma,	Pupils know: that carbon is recycled through natural processes in the atmosphere, ecosystems, oceans and the earth's crust as well as human activities that the earth's atmosphere contains around 78% nitrogen, 21% oxygen, Earth 4 - Earth resources

	night and the apparent movement of the sun across the sky.		with minerals arranged in crystals that metamorphic rocks are formed from existing rocks exposed to heat and pressure over a long time that sedimentary, igneous and metamorphic rocks can be inter converted through the rock cycle that weathering is the wearing down of rock by physical, chemical or biological processes that erosion is the movement of rock by water, ice or wind (transportation) that the solar system consists of planets rotating on tilted axes while orbiting the sun, moons orbiting planets and sunlight spreading out and being reflected. that an orbit is a path taken by a satellite, planet or star moving around a larger body. Earth completes one orbit of the sun every year that stars are bodies which give out light, and which may have a solar system of planets that our solar system is a tiny part of a galaxy, one of many billions in the Universe that a galaxy is a collection of stars held together by	resources that there is only a certain quantity of any resource on earth, so the faster it is extracted, the sooner it will run out. Recycling reduces the need to extract resources that most metals are found combined with other elements, as a compound, in ores. The more reactive a metal, the more difficult it is to separate it from its compound. Carbon displaces less reactive metals, while electrolysis is needed for more reactive metals

			gravity. Our galaxy is called the Milky Way that an exoplanet is a planet that orbits a star outside our solar system	
	Where in the curriculum this is taught: Y5 - Earth and Space. Autumn term	Where in the curriculum this is taught:	Where in the curriculum this is taught: Y7 - Earth Summer term	Where in the curriculum this is taught: Y8 - Earth Summer term
CHEMISTRY Properties and changes of materials KS2 Matter KS3	Pupils know: How to group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity electrical and thermal), and response to magnets. that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. how to use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. how to give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.		Pupils know: that there are three common states of matter: solid, liquid and gas. Recognise and describe the properties of solids, liquids and gases the terms for changes of state: solid to liquid, liquid to gas, gas to liquid, liquid to solid and solid to gas that all matter is made of very small particles (atoms, ions or molecules) and that these particles are arranged in different ways in solids, liquids and gases that particles have energy and that they can gain or lose energy when being heated or cooled. Heating substances causes them to expand whilst cooling causes them to contract. This affects the density of the substance	Pupils know: that the Periodic table shows all the elements arranged in rows and columns, and groups are columns of the periodic table and that Periods are rows that metals are generally found on the left side of the table, non-metals on the right that Group 0 contains unreactive gases called noble gases that physical properties are features of a substance that can be observed without changing the substance itself that Group 1 contains reactive metals called alkali metals that chemical properties are features of the way a substance reacts with other substances that Group 7 contains non-metals called halogens

	that dissolving, mixing and changes of state are reversible changes. that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.		that gas pressure is caused by collisions of particles with the walls of a container that diffusion is the process by which particles in liquids or gases spread from a region many particles to one where there are fewer that a pure substance consists of only one type of element or compound and has a fixed melting and boiling point. Mixtures may be separated due to differences in their physical properties the terms solution, solvent and solute in the context of making a mixture of water and a soluble solid that the method chosen to separate a mixture depends on which physical properties of the individual substances are different that chromatography is used to separate mixtures of different coloured substances that solubility is the maximum mass of solute that dissolves in a certain volume of solvent	that most substances are not pure elements, but compounds or mixtures containing atoms of different elements. that elements are what all substances are made up of, and which contain only one type of atom that a compound is a pure substance made up of two or more elements strongly joined together that a chemical formula shows the elements present in a compound and their relative proportions the symbols: hydrogen, oxygen, nitrogen, carbon, hydrogen, iron, zinc, copper, sulfur, aluminium, iodine, bromine, chlorine, sodium, potassium & magnesium that atoms are the smallest particle of an element that can exist that molecules are two thousands of atoms joined together. Most non-metals exist either as small or giant molecules that a polymer is a molecule made of thousands of smaller molecules in a repeating pattern. Plastics are man-made polymers, starch is a natural polymer

	Where in the curriculum this is taught: Y5 Properties and changes of materials of materials. Spring term	Where in the curriculum this is taught:	Where in the curriculum this is taught: Y7 Matter ,Autumn term Matter	Where in the curriculum this is taught: Y8 Matter ,Autumn term Matter
CHEMISTRY Reactions KS3			Pupils know: that metals are: shiny, good conductors of electricity and heat, malleable and ductile, and usually solid at room temperature. Non-metals are dull, poor conductors of electricity and heat, brittle and usually solid or gaseous at room temperature that iron, nickel and cobalt are magnetic; mercury is a metal that is liquid at room temperature; bromine is a non-metal that is liquid at room temperature • Know that some metals react with acids to produce salts and hydrogen that metals can be arranged as a reactivity series in order of how readily they react with other substances that oxidation is a reaction a substance combines with oxygen and metals and non-metals react with oxygen to form oxides which are either bases or acids that displacement is a reaction where a more reactive metal takes the	Pupils know: that an exothermic reaction is one in which energy is given out, usually as heat or light that an endothermic reaction is one in which energy is taken in, usually as heat that during a chemical reaction bonds are broken (requiring energy) and new bonds formed (releasing energy) that a chemical bond is a force that holds atoms together in molecules that catalysts are substances that speed up a chemical reaction but are unchanged at the end that thermal decomposition is a reaction where a single reactant is broken down into simpler products by heating that chemical changes can be described by a model where atoms and molecules in reactants rearrange to make the products and the total number of atoms is conserved that combustion is a reaction

			place of a less reactive metal in a compound that pH is a scale of acidity and alkalinity from 0 to 14 that acids have a pH below 7, neutral solutions have a pH of 7, alkalis have a pH above 7; that hydrochloric, sulfuric and nitric acid are strong acids; and that acetic and citric acid are weak acids that indicators are substances used to identify whether unknown solutions are acidic or alkaline that mixing an acid and alkali produces a chemical reaction, neutralisation, forming a chemical called a salt and water that a base is a substance that neutralises an acid – those that dissolve in water are called alkalis	with oxygen in which energy is transferred to the surroundings as heat and light
	Where in the curriculum this is taught:	Where in the curriculum this is taught:	Where in the curriculum this is taught: Y7 Reactions Spring term Reactions	Where in the curriculum this is taught: Y8 Reactions Spring term Reactions
PHYSICS Light KS2 Waves KS3		Pupils know: that light appears to travel in straight lines. light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.	Pupils know: how when a light ray meets a different medium, some of it is absorbed and some reflected the terms transparent, translucent, opaque,	Pupils know: how when a wave travels through a substance, particles move to and fro, transferring energy in the direction of movement of the wave

		that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	absorption and scattering of light how to draw ray diagrams to show refraction occurring when light travels into a less dense medium and into a more dense medium how to draw a ray diagram to show reflection from a mirror, including the incident ray, reflected ray and normal line the difference between convex lenses and concave lenses. Describe how lenses may be used to correct vision and relate this to the structure of the eye the terms amplitude, frequency and wavelength the amplitude and frequency of a wave from a diagram or oscilloscope picture the term auditory range and explain why it means humans cannot hear certain sounds	the term pressure wave and give examples of pressure waves • Describe the functions of microphones and loudspeakers with examples including light and sound, the differences between longitudinal and transverse waves how a physical model of a transverse wave shows how the waves moves from place to place, while the material it travels through does not with examples, the meaning of transmission of a wave
	Where in the curriculum this is taught:	Where in the curriculum this is taught: Y6 Light, Autumn term	Where in the curriculum this is taught: Y7 Waves, Summer term	Where in the curriculum this is taught: Y8 Waves, Summer term
PHYSICS Forces	Pupils know: that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.		Pupils know: how if the overall, resultant force on an object is non-zero, its motion changes and it slows down, speeds up or changes direction	Pupils know: the term contact force and give examples of these type of forces how to draw a series of diagrams showing the size

	the effects of air resistance, water resistance and friction that act between moving surfaces. that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.		how to use the formula speed = distance / time how the speed of an object varies when measured by observers who are not moving, or moving relative to the object how the motion of two objects moving at different speeds in the same direction would appear to the other how to differentiate between mass and weight how to draw force diagrams to show the action of gravity in different situations. how gravity holds planets and moons in orbit around larger bodies. how gravity compares to other forces	and direction of forces acting on a series of objects of the terms deformation, tension and compression and give examples how different materials behave under tension or compression how to draw graphs to show linear and non-linear relationships the terms friction and drag how the effect of a force differs depending on the area over which the force applies with examples how pressure acts in a fluid in all directions and increases with depth atmospheric pressure as the pressure caused by the weight of the air above a surface how to draw annotated diagrams to explain the behaviour of fluids in a variety of different situations where the pressure is unequal
	Where in the curriculum this is taught: Y5 Forces. Autumn term	Where in the curriculum this is taught:	Where in the curriculum this is taught: Y7 -Autumn term	Where in the curriculum this is taught: Y8 -Autumn term
PHYSICS Electricity KS2 Electromagnets KS3		Pupils know: the brightness of a lamp or the volume of a buzzer is associated with the number	Pupils know: How to draw a circuit diagram to show how voltage can be measured in	Pupils know: How to draw diagrams of the field lines around magnetic materials, showing the

		and voltage of cells used in the circuit. How to compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. recognised symbols when representing a simple circuit in a diagram	a circuit with several components how in a series circuit voltage is shared between each component and in a parallel circuit voltage is the same across all the components how to use a table of voltage against current to find the ratio of voltage to current and therefore determine the resistance potential difference as the amount of energy shifted from the battery to the moving charge, or from the charge to circuit components, in volts • Use energy to explain the sizes of voltages in a circuit difference between electrical conductors and electrical insulators and give examples of their uses how in a series circuit current is the same in all of the components and in a parallel circuit current is split between the loops of the circuit current as the flow of electrical charge, with the unit amperes (A) how to draw diagrams to explain how objects may become charged when they are rubbed together	direction and strength of the magnetic fields examples of magnetic materials and examples of practical uses of the magnetic properties of these materials the behaviour of two magnets when they are brought together, including interactions between like poles and unlike poles knowledge of magnets to navigation using the earth's magnetic field how an object made of a magnetic material will behave if placed in a magnetic field the pattern of field lines and the force around two or more magnets placed near each other why some materials are magnetic N how an electromagnet generates a magnetic field the factors which effect the strength of the magnetic field generated by an electromagnet

			the charge of an object to the gain or loss of electrons methods of reducing the risk of getting electrostatic shocks	
	Where in the curriculum this is taught:	Where in the curriculum this is taught: Y6 Electricity Spring term	Where in the curriculum this is taught: Y7 Autumn term Electromagnetism	Where in the curriculum this is taught: Y8 – Autumn term Electromagnetism
PHYSICS Energy			Pupils know: How to define power as how quickly energy is transferred by a device how to use the formula cost = power (kW) x time (hours) x price (per kWh) difference between renewable and non-renewable energy resources and give examples of each energy transfers from a renewable or non-renewable resource to an electrical device in the home actions a government or communities could take in response to rising energy demand, including reducing electricity use different types of energy store and give examples of each how the energy of an object depends on its speed, temperature, height or whether it is stretched or	Pupils know: the term work and give examples where work is done, including displacements and deformations the factors that change the work required to move an object examples of how levers, pulleys and wheels are all used to make work easier the difference between thermal energy and temperature what factors an object's thermal energy depends on

			compressed how to make observations of how sound travels to the properties of a longitudinal wave energy is dissipated in a range of situations	
	Where in the curriculum this is taught:	Where in the curriculum this is taught:	Where in the curriculum this is taught: Y7 Autumn term Energy	Where in the curriculum this is taught: Y8 –Spring term Energy

Curriculum Impact:
Pupils achieve academically, are ready for their next steps in education and have high aspirations for their future.

Live: Ensure pupils develop scientific investigation skills, an enquiring mind and high-quality communication skills which they can apply to lifelong learning so that they can make an active contribution to society.

- Pupils enjoy their science lessons and actively participate.
- Pupils, regardless of background, are able to investigate a problem, question current scientific knowledge and communicate their ideas clearly.

Love: Broaden pupils' horizons by giving them opportunities to explore current environmental, global and scientific issues in order for them to better understand the world they live in.

- Pupils are inspired by what they have learnt about science in the world and are keen to pursue these interests further through career choices or travel.

Learn: Develop independent, confident and successful scientists who achieve the best possible academic standards, whatever their starting point.

- Pupils make good progress and are able to achieve academic success
- Disadvantaged pupils are supported in order to close the gap between themselves and their peers