Year 5

Paul Shanks & Peter Howard

Knowledge Curriculum Outline

Year 5



EMAT Science Knowledge Based Curriculum

**Introduction**

Current events and technology are constantly changing, but there remains a significant body of enduring knowledge and skills that form the foundation of a strong curriculum. The EMAT Knowledge Based Curriculum is based on these foundations and has its values of ***Empower***, ***Motivate***, ***Aspire*** and ***Transform*** running throughout its spine.

As Leesa Wheelahan states within her book, Why Knowledge Matters in Curriculum: A Social Realist Argument. New Studies in Critical Realism and Education, “…providing students with access to knowledge should be the *raison d'etre* of education. Its premise is that access to knowledge is an issue of social justice because society uses it to conduct its debates and controversies.”

The Core Knowledge Partnership further adds, “All children should be able to unlock the library of the world's literature; to comprehend the world around them; to understand where they stand (literally) on the globe, and to realise the heritage that the history of their country has bestowed on them. In order to achieve this, it is important for every child to learn the fundamentals of mathematics; basic principles of science; theories and structures of government; significant events and themes from history; masterpieces of art, music and literature from around the world; and stories and poems that have been passed down through the generations.”

The core material within the EMAT curriculum is based upon the materials available from the Core Knowledge Partnership.

By explicitly identifying what children should learn in each academic year, it is possible to ensure a coherent approach to developing cumulative knowledge across all school years, making the most efficient and effective use of teaching time.”

The EMAT curriculum is deliberately focused on the development of language and vocabulary. Vocabulary is essential to understanding the content taught in our academies and being able to articulate the knowledge that lies within. As Iman (2009) states, “An abundance of research supports the connections between vocabulary, particularly academic vocabulary and reading comprehension”.

Iman’s statement should come as no surprise to those working within an EMAT academy and as such an overarching aim of the Knowledge curriculum is to be able to empower and motivate children to become lifelong learners and aspire to be the very best that they can be and transform their life chances through an enriched experience every day at school.

**Information on this document**

Within the following pages you will find the knowledge overview for the Year 5 Curriculum. This document outlines the knowledge that should be taught in Science across the year. Academies are free to design their topic and themes as long as these have the EMAT knowledge embedded within it.

The document provides some core vocabulary that must be taught alongside the knowledge but academies are free to add their own to this. This is not an exhaustive list but the minimum required.

**Knowledge Organisers**

What are Knowledge Organisers? Knowledge Organisers are sets of key facts or information that pupils must know and be able to recall in order to master any given unit of work. Typically, a Knowledge Organiser will fit on a single sheet of A4 or A3 and will be provided to the pupils to support their learning but can also support home learning.

Knowledge Organisers should contain the core vocabulary and knowledge that the children are expected to learn as part of their topic or unit. Across the academy it is important that each Knowledge Organiser is laid out in the same fashion to support the visualising of the information and memory retention.

There are a multitude of Knowledge Organisers available online, as well as templates for academies to formulate their own.

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| **YEAR 5** |
| **Science** | **Vocabulary** | **Cultural Capital** |
| 1. **THE HUMAN BODY: CIRCULATORY AND RESPIRATORY SYSTEMS**

**A. THE CIRCULATORY SYSTEM*** Pioneering work of William Harvey
* Heart: four chambers (atrium/atria or atriums [plural] and ventricle/ventricles), aorta
* Blood
* Red blood cells, white blood cells, platelets, haemoglobin, plasma, antibodies
* Blood vessels: arteries, veins, capillaries
* Blood pressure, pulse
* Filtering function of liver and spleen
* Fatty deposits can clog blood vessels and cause a heart attack.
* Blood types (four basic types: A, B, AB, O) and transfusions

**B. THE RESPIRATORY SYSTEM*** Process of taking in oxygen and getting rid of carbon dioxide
* Nose, throat, voice box, trachea (windpipe)
* Lungs, bronchi, bronchial tubes, diaphragm, ribs, alveoli (air sacs)
* Smoking: damage to lung tissue, lung cancer
 | CirculatoryRespiratoryHeartAtriumVentricleAortaBloodWhite/Red blood cellsPlateletsHaemoglobinPlasmaAntibodiesVesselsArteriesVeinsCapillaries Blood pressurePulseLiverSpleenBlood types – A, B, AB, OTransfusionBreatheOxygenCarbon DioxideExhaleNoseThroatVoice boxTracheaLungsBronchiBroncheal tubesDiaphragmRibsAlveoliSmokingLung Cancer |  |
| 1. **CHEMISTRY: BASIC TERMS AND CONCEPTS**
2. **ATOMS**

All matter is made up of particles too small for the eye to see, called atoms. Scientists have developed models of atoms; while these models have changed over time as scientists make new discoveries; the models help us imagine what we cannot see.* Atoms are made up of even tinier particles: protons, neutrons, electrons.

The concept of electrical charge* Positive charge (+): proton
* Negative charge (-): electron
* Neutral (neither positive or negative): neutron’
* ‘Unlike charges attract, like charges repel’ (relate to magnetic attraction and repulsion)
1. **PROPERTIES OF MATTER**
* Mass: the amount of matter in an object, similar to weight
* Volume: the amount of space a thing fills
* Density: how much matter is packed into the space an object fills
* Vacuum: the absence of matter
1. **ELEMENTS**
* Elements are the basic kinds of matter, of which there are a little more than one hundred.
* There are many different kinds of atoms, but an element has only one kind of atom.
* Familiar elements, such as gold, copper, aluminium, oxygen, iron
* Most things are made up of a combination of elements.
1. **SOLUTIONS**

A solution is formed when a substance (the solute) is dissolved in another substance (the solvent), such as when sugar or salt is dissolved in water; the dissolved substance is present in the solution even though you cannot see it. Concentration and saturation (as demonstrated through simple experiments with crystallisation) | AtomsParticlesProtonsNeutronsElectronsPositive ChargeNegative ChargeNeutral ChargeMassVolumeDensityVacuumPeriodic TableMatterGoldCopperAluminiumOxygenIronSolutionsSoluteDissolveSolventConcentrateSaturationCrystallisation |  |
| 1. **ELECTRICITY**

Teachers: Through reading and observation, and ***experiment***, examine the following:* Electricity as the charge of electrons
* Static electricity
* Electric current
* Electric circuits, and experiments with simple circuits (battery, wire, light bulb, filament, switch, fuse)
* Closed circuit, open circuit, short circuit
* Conductors and insulators
* Electromagnets: how they work and common uses
* Using electricity safely
 | Charge of electronsStaticCurrentCircuitsWireLightbulbFilamentCellSwitchFuseClose/Open Short circuitConductorInsulatorElectro-magnets |  |
| 1. **GEOLOGY**
2. **THE EARTH’S LAYERS**
* Crust, mantle, core (outer core and inner core)
* Movement of tectonic plates
* Earthquakes
* Faults, San Andreas fault
* Measuring intensity: seismograph and Richter scale
* Tsunamis
* Volcanoes
* Magma
* Lava and lava flow
* Active, dormant and extinct
* Famous volcanoes: Vesuvius, Krakatoa, Mount St. Helens
* Hot springs and geysers: Old Faithful (in Yellowstone National Park, US)
* Theories of how the continents and oceans were formed: Pangaea and continental drift
* **B. HOW MOUNTAINS ARE FORMED**
* Folded mountains, fault-block mountains, dome-shaped mountains
* **C. ROCKS**
* Formation and characteristics of metamorphic, igneous, and sedimentary rock
* **D. WEATHERING AND EROSION**
* Physical and chemical weathering
* Weathering and erosion by water, wind and glaciers
* The formation of soil: topsoil, subsoil, bedrock
 | CrustMantleCoreTectonic platesEarthquakesFault (San Andreas)SeismographRichter ScaleTsunamiVolcanoMagmaLarvaActive, dormant and extinctContinental driftPangaeaFoldedFault-blockDome-shapedMetamorphicIgneousSedimentaryWeatheringErosionPhysicalChemicalWater, wind and glacier erosionFormationSoilTopsoilSubsoilBedrock |  |
| 1. **METEOROLOGY**

The water cycle (review from Year 3): evaporation, condensation, precipitation* Clouds: cirrus, stratus, cumulus (review from Year 3)
* The atmosphere
* Troposphere, stratosphere, mesosphere, thermosphere, exosphere
* How the Sun and the Earth heat the atmosphere
* Air movement: wind direction and speed, prevailing winds, air pressure, low and high pressure, air masses
* Cold and warm fronts: thunderheads, lightning and electric charge, thunder, tornadoes, hurricanes
* Forecasting the weather: barometers (relation between changes in atmospheric pressure and weather), weather maps, weather satellites.

Weather and climate: ‘weather’ refers to daily changes in temperature, rainfall, sunshine, etc., while ‘climate’ refers to weather trends that are longer than the cycle of the seasons. | Water cycleEvaporationCondensationPrecipitationCloudsCirrusStratusCumulusAtmosphereTroposphereStratosphereMesosphereThermosphereExosphereWindPrevailingAir pressure (low/high)Air MassesFrontsOccludedThunder headsLightningTornadoesHurricanesBarometerWeather mapSatelliteClimate |  |
| 1. **EVOLUTION**
* Animals have offspring that are of the same kind but often offspring have different appearances
* Animals and plants have adapted to suit the environment within which they live
* Adaptation may lead to evolution: Darwin’s finches
 | Life cycleOffspringAdaptDarwin |  |
| 1. **SCIENCE BIOGRAPHIES**
* Michael Faraday (chemist and physicist, developed the electric motor and electric generator)
* Elizabeth Garrett Anderson (English physician and feminist, first Englishwoman physician and
* surgeon)
* Florence Nightingale (pioneering woman nurse during the Crimean War who later established the
* Nightingale Training School for nurses at St Thomas' Hospital in London)
* Charles Drew (American doctor and medical researcher)
* Charles Darwin (English naturalist known for his theory of evolution called Natural Selection)
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