 EMA subject review – Science at KS1 & KS2

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| Key stage 1 Aims | | | Implications for BAME and EAL learners |
| Working scientifically, pupils should be taught to use the following practical scientific methods, processes and skills   * asking simple questions and recognising that they can be answered in different ways * observing closely, using simple equipment * performing simple tests * identifying and classifying * using their observations and ideas to suggest answers to questions * gathering and recording data to help in answering questions | | | The aims of the Science POS present significant language expectations for KS1 learners for whom English is not their first language. Vocabulary includes a wide range of common words that also have a specific scientific meaning, as well as extensive new subject specific vocabulary. All these elements need to be systematically taught.   * Diversity is reflected in the teaching of Science and the exemplification of ideas and events. Pupils from culturally diverse backgrounds feel included throughout the learning. * Learning is accessible and engaging for BAME and EAL learners: * First language learning and consolidation is encouraged * Technical language is explicitly taught and modelled * Science can be studied in familiar cultural contexts * Groupings are flexible depending on task. Language based activities, such as questioning, recording and hypothesizing, have EAL learners grouped with strong English language exponents. |
| Key stage 1 Subject content | | | Implications for BAME and EAL learners |
| For each unit pupils should be taught to: | | | * Diversity is reflected in the teaching and resourcing of science and the exemplification topics covered. Pupils from culturally diverse backgrounds feel included throughout the learning. * Evidence exists of the curriculum reflecting the diversity and language needs of BAME and EAL learners * New vocabulary is systematically taught, including pre-teaching and first language learning. * First language learning is encouraged and access to first language resources is facilitated |
| **Year 1**  **Plants**   * identify and name a variety of … plants… * identify and describe basic structure of plants   **Animals including humans**   * identify and name a variety of common animals including fish, amphibians, reptiles, birds… * identify and name a variety of common animals … carnivores, herbivores… * describe and compare the structure of animals * identify, name, draw and label the human body   **Everyday materials**   * distinguish between an object and (its) material * identify and name everyday materials… * describe the physical properties of materials * compare and group … everyday materials   **Seasonal changes**   * observe changes across the four seasons * observe and describe weather of seasons… | | **Year 2**  **Plants**   * observe and describe how seeds grow… * find out and describe how plants need water…   **Animals including humans**   * notice… have offspring which grow into adults * find out about and describe basic needs… * describe the importance for humans of…   **Everyday materials**   * identify and compare suitability of materials… * properties of shapes of solid objects and how changed by squashing, bending, twisting…   **Living things & habitats**   * explore and compare the differences between things that are living, dead, never alive * identify that most living things live in habitats * identify and name a variety of plants and … * describe how animals obtain their food… |
| Lower Key stage 2 Aims | | | Implications for BAME and EAL learners |
| Working scientifically, pupils should be taught to use the following practical scientific methods, processes and skills   * asking relevant questions and using different types of scientific enquiries to answer them * setting up simple practical enquiries, comparative and fair tests * making systematic and careful observations and, where appropriate, taking accurate measurements * gathering, recording, classifying and presenting data in ways to help in answering questions * recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts… * reporting on findings from enquiries, including oral and written explanations, displays, presentations… * using results to draw simple conclusions, make predictions for new values, suggest improvements… * identifying differences, similarities or changes related to simple scientific ideas and processes * using straightforward scientific evidence to answer questions or to support their findings. | | | * Diversity is reflected in the selection of topics, teaching, resourcing and the exemplification of ideas and events. Pupils from culturally diverse backgrounds feel included throughout the learning * Links are made to BAME scientists and innovators and a global perspective on Science is maintained. * Evidence exists of the curriculum reflecting the diversity and language needs of BAME and EAL learners |
| Lower Key stage 2 Subject content | | | Implications for BAME and EAL learners |
| For each unit pupils should be taught to: | | |  |
| **Year 3**  **Plants**   * identify and describe the functions of parts * explore the requirements of plants for * investigate how water is transported * explore the part that flowers play   **Animals and humans**   * identify that … the right types of nutrition * identify that some animals have skeletons…   **Rocks**   * compare and group together rocks * describe in simple terms how fossils are formed * recognise that soils are made from rocks…   **Light**   * recognise that they need light in order to see * notice that light is reflected from surfaces * recognise how shadows are formed * find patterns in the way shadows change...   **Forces and magnets**   * compare how things move on different surfaces * notice that some forces need contact between two objects, but magnetic forces can act at a distance * observe how magnets attract or repel each other and attract some materials and not others * compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet… * describe magnets as having two poles * predict whether two magnets will attract or repel each other… | **Year 4**  **Living things and their habitat**   * recognise that living things can be grouped in a variety of ways * explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment * recognise that environments can change and that this can sometimes pose dangers to living things.   **Animals including humans**   * describe the simple functions of the basic parts of the digestive system in humans * identify the different types of teeth in humans and their simple functions * construct and interpret a variety of food chains, identifying producers, predators and prey.   **States of matter**   * compare and group materials together… * observe that some materials change state … * identify the part played by evaporation …   **Sound**   * identify how sounds are made, associating… * recognise that vibrations from sounds travel… * find patterns between the pitch of a sound… * find patterns between the volume of a sound… * recognise that sounds get fainter as the…   **Electricity**   * identify appliances that run on electricity * construct a simple series electrical circuit… * identify whether or not a lamp will light in a … * recognise that a switch opens and closes a … * recognise some common conductors… | | * Diversity is reflected in the teaching and resourcing of science and the exemplification topics covered. Pupils from culturally diverse backgrounds feel included throughout the learning. * Evidence exists of the curriculum reflecting the diversity and language needs of BAME and EAL learners * New vocabulary is systematically taught, including pre-teaching and first language learning. * Science illustrated dictionaries are available in lessons * First language learning is encouraged and access to first language resources is facilitated |
| Upper Key stage 2 Aims | | | Implications for BAME and EAL learners |
| Working scientifically, pupils should be taught to use the following practical scientific methods, processes and skills   * planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary * taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate * recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs * using test results to make predictions to set up further comparative and fair tests * reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations * identifying scientific evidence that has been used to support or refute ideas or arguments. | | | * Diversity is reflected in the selection of topics, teaching, resourcing and the exemplification of ideas and events. Pupils from culturally diverse backgrounds feel included throughout the learning * Links are made to BAME scientists and innovators and a global perspective on Science is maintained. * Evidence exists of the curriculum reflecting the diversity and language needs of BAME and EAL learners |
| Upper Key stage 2 Subject content | | | Implications for BAME and EAL learners |
| For each unit pupils should be taught to: | | |  |
| **Year 5**  **Living things and their habitat**   * describe the differences in the life cycles of … * describe the life process of reproduction in …   **Animals and humans**   * describe changes as humans develop to old age   **Properties and changes of materials**   * compare and group together everyday… * know that some materials will dissolve in liquid to form a solution… * use knowledge of solids, liquids and gases to decide how mixtures might be separated… * give reasons, based on evidence from comparative and fair tests… * demonstrate that dissolving, mixing and changes of state are reversible changes * explain that some changes result in the formation of new materials…   **Earth and Space**   * describe the movement of the Earth… * describe the movement of the Moon relative … * describe the Sun, Earth and Moon as … bodies * use the idea of the Earth’s rotation to explain day and night and apparent movement of sun   **Forces**   * explain that unsupported objects fall… * identify the effects of air resistance, water resistance and friction… * recognise that some mechanisms… | **Year 6**  **Living things and their habitat**   * describe how living things are classified… * give reasons for classifying plants and animals...   **Animals including humans**   * identify and name the main parts of the human * recognise the impact of diet, exercise, drugs… * describe the ways in which nutrients and water are transported within animals…   **Evolution and inheritance**   * recognise that living things have changed… * recognise that living things produce offspring … * identify how animals and plants are adapted…   **Light**   * recognise light appears to travel in straight lines * use the idea that light travels in straight lines… * explain that we see things because … * use the idea that light travels in straight …   **Electricity**   * associate the brightness of a lamp or the volume of a buzzer with cells used in the circuit * compare and give reasons for variations in how components function… * use recognised symbols when representing a simple circuit in a diagram. | | * Diversity is reflected in the selection of topics, teaching, resourcing and the exemplification of ideas and events. Pupils from culturally diverse backgrounds feel included throughout the learning * Links are made to BAME scientists and innovators and a global perspective on Science is maintained. * Evidence exists of the curriculum reflecting the diversity and language needs of BAME and EAL learners * New vocabulary is systematically taught, including pre-teaching and first language learning. * Science illustrated dictionaries are available in lessons * First language learning is encouraged and access to first language resources is facilitated |

Questions to support self-evaluation of inclusion in the Science curriculum

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| **How inclusive is the Science curriculum?** |
| Is the curriculum giving pupils the essential knowledge and skills they need?  (next stage/destinations)   * Do EAL learners have the language tools and vocabulary to access the curriculum? * Do BAME pupils understand that there are no limits to their aspirations? |
| Do pupils know and remember more?   * How does knowledge and recollection compare to non-EAL peers? * Does the knowledge demonstrated by pupils indicate a view that embraces diversity? |
| Is the curriculum cumulative?  (step by step in learning more knowledge)   * Are there any gaps in learning for EAL/BAME pupils? * Do pupils see themselves represented in scientists and inventors studied, and contexts explored? |
| How well does the subject curriculum fit in with other subjects?   * Are links made to other subjects? * Are links made to BAME mathematicians, scientists, sportsman, artists and musicians? * Are there opportunities for pupils to study in their first/other language? |

Examples of resources that reflect the diversity of the local community and figures in Science:

* Scholastic: <https://www.scholastic.com/parents/books-and-reading/raise-a-reader-blog/7-books-to-inspire-young-inventors.html>
* British Library: [https://www.bl.uk/childrens-books/articles/non-fiction-books-for-children#](https://www.bl.uk/childrens-books/articles/non-fiction-books-for-children)

**Local resources**

* MK Museum: <https://miltonkeynesmuseum.org.uk/>
* Bletchley Park: <https://bletchleypark.org.uk/>
* MK African Diaspora Foundation: <http://www.africandiasporafoundation.org.uk/who-we-are/>

**Websites**

* Access and engagement in science. Teaching pupils for whom English is an additional language: <https://www.naldic.org.uk/Resources/NALDIC/Teaching%20and%20Learning/0610-2002Science.pdf>
* The Association for Science Education: <https://www.ase.org.uk/>
* Biography.com: <https://www.biography.com/people/groups/black-inventors>
* History.com: <https://www.history.com/news/8-black-inventors-african-american>
* Famous Scientists site: <https://www.famousscientists.org/famous-muslim-arab-persian-scientists-and-their-inventions/>

**General Resources:**

BAME education <https://libguides.ioe.ac.uk/BAMEresources>

National Archive – BAME histories <https://www.nationalarchives.gov.uk/education/resources/black-asian-and-minority-ethnic-histories/>

Diversity texts: <https://www.letterboxlibrary.com/> - diversity texts with clpe <https://clpe.org.uk/> CLPE reflecting realities research: <https://clpe.org.uk/RR>

<https://www.theguardian.com/childrens-books-site/2014/oct/13/50-best-culturally-diverse-childrens-books>

Links to EMA Network Diversity and Inclusion seminar – July 2021:

\* Hannah Wilson – [Vision and values: embedding diversity, equity and inclusion in your school](https://www.youtube.com/watch?v=6iMXQ_zVSTI)

\* Bennie Kara –[Diversifying your curriculum](https://www.youtube.com/watch?v=mg5MquP6-PA)

\* Pauline Lyseight-jones and Liz Agbettoh - [Honest conversations on race and the importance of language](https://www.youtube.com/watch?v=vWv3xwpB-MU)

\* Shammi Rahman - [Addressing difficult conversations](https://www.youtube.com/watch?v=J5OZRgN8SQk)

\* Serdar Ferit – [Lyfta and immersive human stories](https://www.youtube.com/watch?v=J5OZRgN8SQk) (Need to scroll through to reach Lyfta presentation)

Above with Urls:

Hannah Wilson <https://www.youtube.com/watch?v=6iMXQ_zVSTI>

Bennie Kara <https://www.youtube.com/watch?v=mg5MquP6-PA>

Pauline Lyseight-jones <https://www.youtube.com/watch?v=vWv3xwpB-MU>

Shammi Rahman – Difficult converations – first part, Lyfta – Moving Stories – second part: <https://www.youtube.com/watch?v=vWv3xwpB-MU> (Also includes EMA Network resources and MAKE presentation)

**OFSTED**

2021 subject review: <https://www.gov.uk/government/news/ofsted-publishes-science-research-review-the-first-in-a-series-of-subject-reviews>