 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.
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| 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
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| **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…
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| 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
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| 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
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| 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
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| 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.
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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?
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| 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?
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| 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?
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| 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?
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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>