Science
Key Stage 1

Curriculum map

OAK NATIONAL ACADEMY

1. Philosophy

Six underlying attributes at the heart of Oak's curriculum and lessons.

Lessons and units are **knowledge and vocabulary rich** so that pupils build on what they already know to develop powerful knowledge.

Knowledge is **sequenced** and mapped in a **coherent** format so that pupils make meaningful connections.

Our **flexible** curriculum enables schools to tailor Oak's content to their curriculum and context.

Our curriculum is **evidence informed** through rigorous application of best practice and the science of learning.

We prioritise creating a **diverse** curriculum by committing to diversity in teaching and teachers, and the language, texts and media we use, so all pupils feel positively represented.

Creating an **accessible** curriculum that addresses the needs of all pupils is achieved to accessibility guidelines and requirements.

2. Units

KS1 Science is formed of 12 units and this is the recommended sequence:

Unit Title	Recommended year group	Number of lessons
1 Materials	Year 1	6
2 Building things	Year 1	6
3 The animal kingdom	Year 1	6
4 Plants	Year 1	6
5 Seasons and change	Year 1	6
6 Sound	Year 1	6
7 Changing materials	Year 2	6
8 Mixing and making	Year 2	6
9 Human lifestyle	Year 2	6

10 Habitats	Year 2	6
11 Space	Year 2	6
12 Extraordinary scientists	Year 2	6

3. Lessons

Unit 1 Materials — 6 Lessons

Lesson number	Lesson question	Pupils will learn
1.	**What is a material?**	• Identifying different materials: wood, wool, plastic, glass, metal & paper
2.	**What are objects made from?**	• Identifying the materials used to make different objects
3.	**How can I describe an object?**	• Using different properties of materials to describe them e.g. hard, soft, rough, smooth, shiny, heavy, transparent
4.	**Which materials float and sink?**	• Predicting whether materials will float or sink based on how heavy they are • Testing whether different materials float or sink
5.	**Which materials are absorbent?**	• Testing whether materials are absorbent or waterproof

6. Which material is best for different objects?

- Choosing the best material based on properties for different uses

Unit 2 Building things

6 Lessons

Lesson number	Lesson question	Pupils will learn
1.	**Which materials are waterproof?**	• Deciding the best material to build with based on waterproofness
2.	**What material could I use to build a wall?**	• Designing a waterproof wall • Planning an experiment to test waterproofness
3.	**Is the wall I've built waterproof?**	• Building a wall and testing the waterproofness
4.	**Which materials can withstand strong winds?**	• Designing a strong wall • Planning an experiment to test ability to withstand strong wind
5.	**Will the wall I've built withstand strong winds?**	• Building a wall and testing the strength
6.	**What is a mixture?**	• Learning about combining/mixing materials to make stronger materials

Unit 3 The animal kingdom

6 Lessons

Lesson number	Lesson question	Pupils will learn
1.	**What is a living thing?**	• Features of a living thing • What animals need to survive
2.	**What is the difference between an invertebrate and a vertebrate?**	• Differences between invertebrate and vertebrates • Using classification keys • Grouping animals based on characteristics
3.	**Which animal families are invertebrates?**	• Characteristics of arachnids, insects and crustaceans • The features of an exoskeleton
4.	**Which animal families are vertebrates?**	• Characteristics of amphibians • Characteristics of reptiles
5.	**What are the differences between mammals and birds?**	• Characteristics of mammals • Characteristics of birds

6. What types of food do living things eat?

- Carnivores, omnivores and herbivores
- Looking at the teeth of different animals

Unit 4 Plants

6 Lessons

Lesson number	Lesson question	Pupils will learn
1.	**How do I plant a bean?**	• Planting a bean and setting up an investigation into what plants need to survive
2.	**What types of plants grow in the wild?**	• Identifying wildflowers • Understanding the importance of wildflowers
3.	**What is the difference between deciduous and evergreen trees?**	• Differences between deciduous and evergreen trees • Identifying common trees from their leaves
4.	**What are the parts of trees and plants called?**	• Parts of a tree: trunk, leaves, fruit, branches, roots • Parts of a flowering plant: seeds, flower, buds, leaves, stem, roots
5.	**What changes occur to a tomato plant?**	• Stages of growth in tomato plants • How to plant tomato seeds

6.	**What changes have occurred to my bean plant?**	• Recording changes to the bean plant including drawing a diagram and measuring with a ruler

Unit 5 Seasons and change

6 Lessons

Lesson number	Lesson question	Pupils will learn
1.	**What do we know about the weather?**	• Naming different types of weather • Identifying the 4 seasons based on weather • Starting a weather log to be used throughout the whole unit
2.	**How does the weather change across the seasons?**	• Describing the weather in each season • Temperature and how it changes
3.	**How do trees change across the seasons?**	• Describing the appearance of trees • Linking the months of the year to each season • What will trees look like during different events? e.g. Father's Day or Halloween
4.	**How can you measure rainfall?**	• Defining a liquid • Making a rain gauge

5.	**What is hibernation?**	• Defining hibernation • Examples of animals that hibernate • Why animals hibernate • Where animals hibernate
6.	**How can we record wind direction?**	• Ordering types of wind by strength • Using a scale to record wind strength

Unit 6 Sound

6 Lessons

Lesson number	Lesson question	Pupils will learn
1.	**What are the 5 senses?**	• The body part associated with each sense • Recording the sounds you can hear
2.	**What is sound?**	• Definition of sound • Ordering sounds from quietest to loudest
3.	**How do we hear?**	• How we hear • Causes of deafness • Examples of sign language
4.	**How do we look after our ears?**	• The zones of the ear • How to look after each zone e.g. cleaning, protecting from loud volumes
5.	**How can we describe the pitch of sounds?**	• Difference between high and low pitch sounds • Identifying high and low pitched sounds

6. How can we make and describe different sounds?

- Describing sounds based on volume and pitch
- Grouping sounds based on volume and pitch
- Making a range of sounds

Unit 7 Changing materials

6 Lessons

Lesson number	Lesson question	Pupils will learn
1.	**Which material should I use?**	• Common materials and their properties • Matching materials to uses based on their properties
2.	**How can the shape of solid objects be changed?**	• Examples of solid objects • Squashing, bending, twisting, stretching • Testing different materials
3.	**Which material is the stretchiest?**	• Testing the elasticity of different fabrics
4.	**Which materials are absorbent?**	• Testing whether a variety of materials used are absorbent
5.	**What is the difference between raw and synthetic materials?**	• Examples of raw vs synthetic materials (Natural vs man-made) • Sorting materials based on their properties

6. Why do we change materials?

- Comparing the properties of raw vs synthetic materials
- Examples of material scientists

Unit 8 Mixing and making

6 Lessons

Lesson number	Lesson question	Pupils will learn
1.	**What are the differences between solids, liquids and gases?**	• Examples of solids, liquids and gases • How to identify solids, liquids and gases
2.	**What happens when you heat a solid?**	• Describe melting • Observing different examples of melting
3.	**Which mixture makes the best bubbles?**	• Defining a mixture • Testing different mixtures
4.	**What happens when I mix a solid and liquid together?**	• Insoluble and soluble solids • Observing different examples
5.	**How can I separate a mixture?**	• Sorting mixtures by hand, sieving and magnetism • Choosing the appropriate method to separate mixtures

6. Are there some changes we can't reverse?

- Reversible vs irreversible changes
- Examples of irreversible changes e.g. cooking

Unit 9 Human lifestyle

6 Lessons

Lesson number	Lesson question	Pupils will learn
1.	**What are the different parts of the human body?**	• Identify major organs in human body • Function of different parts of the body
2.	**Why is exercise so important?**	• Different types of exercise • Importance of exercise • Heart rate investigation
3.	**What is a healthy diet?**	• Major food groups and examples • Designing a balanced meal
4.	**How do our bodies change as we get older?**	• Characteristics of babies, toddlers, children, teenagers, adults and elderly people • Creating a human changes timeline

5.	**Why is it important to be hygienic?**	• Defining germs and hygiene • Florence Nightingale and hygienic hospital practices • Mould investigation
6.	**Whose job is it to keep us healthy?**	• The role of doctors and nurses • The achievements of Edward Jenner and Mary Seacole • Different jobs: epidemiologist, sports scientist, nutritionist

Unit 10 Habitats

6 Lessons

Lesson number	Lesson question	Pupils will learn
1.	**What are the characteristics of living things?**	• Identifying living and non-living things • Indicators of living things • What organisms need to survive
2.	**What is a habitat?**	• Defining a habitat • Simple food chains
3.	**What is a microhabitat?**	• Features of woodland habitats • Microhabitats in woodlands
4.	**What lives in a desert habitat?**	• Features of desert habitats • Examples of desert animals • Examples of desert plants

5.	**What lives in a rainforest habitat?**	• Features of rainforest habitats • Examples of rainforest animals • Examples of rainforest plants
6.	**Can a city be a habitat?**	• Features of urban environments • Examples of urban animals • Importance of green spaces in urban environments

Unit 11 Space

6 Lessons

Lesson number	Lesson question	Pupils will learn
1.	**What is Space?**	• Defining space • How we learn about space • Things found in space: planets, sun, moon, stars
2.	**What are the planets in our solar system?**	• Order of planets in solar system • Features of the planets in the solar system
3.	**How does the Earth orbit and rotate?**	• Why do we have seasons and day and night?
4.	**What are constellations?**	• Examples of stars and famous constellations • Drawing constellations
5.	**When and how was space discovered?**	• History of space discovery • Examples of famous astronauts

6. What kind of scientists study space?

- Examples of jobs related to exploring space

Unit 12 Extraordinary scientists

6 Lessons

Lesson number	Lesson question	Pupils will learn
1.	who was Katherine Johnson?	• Katherine Johnson's life story and contributions to science • How maths was used to safely send rockets to space and back
2.	Who is Jane Goodall?	• Jane Goodall's life story and contributions to science • Studying the behaviour of chimpanzees • Conservation of chimpanzee habitats
3.	Who was Katherine Johnson?	• Alan Turing's life story and contributions to science • How to break a code and write our own codes
4.	Who was Louis Pasteur?	• Louis Pasteur's life story and contributions to science • The importance of understanding microorganisms for pasteurisation and vaccines • Studying the best conditions for growing mould

5.	**Who was Caroline Herschel?**	• Caroline Herschel's life story and contributions to science • Studying the stars and constellations
6.	**Who is Mae Jemison?**	• Mae Jemison's life story and contributions to science • What is it like to be an astronaut?

4. Learn More

Contents

1. Introduction to Oak's key stage 1 science curriculum

The following document outlines the Key Stage 1 science curriculum for Oak Academy 2021-2022. Each unit of work is 6 lessons long and designed to last roughly one half term. The following curriculum map provides complete coverage of

statutory topics contained within the national curriculum. Further units that go beyond the national curriculum are also included, to help pupils better understand the subject and the world, as well as preparing them for the next stage of study. Below are a set of principles we have sought to apply in our curriculum planning of both primary and secondary science.

2. Coherence and flexibility

We strive to support schools by giving them an online learning offer that can be flexible, to fit alongside their existing curriculum. We need to balance this together with coherence, as complete flexibility would imply only standalone lessons, where none can build upon any other. In striking this balance, we will lean towards giving the maximum flexibility possible where this does not compromise coherence. Where disciplinary knowledge (working scientifically) is woven into the units there will be reminders of previously used scaffolds and prompts. For the majority of units in KS1 there is no prior knowledge required and so biology, chemistry and physics units could be taught in any order within the key stage (see section 3 below for further clarification).

3. Knowledge organisation

The units in the science curriculum are grouped by key stage, with a suggested route organised within year groups. The substantive knowledge (i.e. the science content) will be taught in units, and the disciplinary knowledge (i.e. working scientifically) is taught in context. Hierarchical elements of working scientifically will be reflected in the units and therefore this will be built up accordingly.

4. Knowledge selection

We are seeking to support schools to deliver the national curriculum to children who cannot attend school. Our choice of what to teach will primarily be guided by the content specified in the national curriculum, but we have also chosen to broaden this to increase challenge and build aspiration (e.g., include more physics at KS1 and KS2, include units in KS1 and KS2 on a diverse range of influential scientists).

5. Inclusive and ambitious

We want Oak to be able to support all children. Our units will be pitched so that children with different starting points can access them. Pupils need to have a large amount of subject knowledge stored in their long-term memory in order to become competent at any subject, and this is especially true of science, where application is often an application of knowledge. For this reason, these lessons are designed to teach science in a clear and deliberate fashion, emphasising secure content knowledge

before moving on to tasks. In this approach, the teacher is the subject expert and the emphasis is on instruction and explanation, followed by deliberate practice supported by modelling, guided practice and scaffolding. Models and analogies will be used where appropriate to allow pupils to visualise or contextualise abstract ideas

6. Pupil engagement

We need pupils to be thinking during science lessons - both to engage with the subject and to strengthen memory of what is being learnt. Our lessons will not be video lectures. We seek to exercise pupils' minds throughout their lessons . This will involve questions and tasks throughout instruction, just as we would with classroom teaching. We will aim to include purposeful practical science in as many of our lessons as possible.

7. Motivation through learning

Like all teachers, we recognise that good presentation helps pupils keep participating in our lessons. However, we are teachers, and not entertainers. We seek to motivate children through our subjects. We believe that what we teach is inherently interesting, and that the joy of learning is our primary motivator. In science, we will provide opportunities where possible for pupils to engage in home experimentation. We will include learning about relevant careers for that unit in many of our units. The scientists that we have chosen to study will reflect the diversity of backgrounds of our pupils. Finally, we will try to be explicit about the real-life relevance of each unit so that it is clear why this knowledge is important.

8. Working scientifically links

Links to the statutory requirements for working scientifically have been made explicit for each unit. Generic statements have been used for simplicity:

- Asking questions
- Performing tests
- Observing and measuring
- Gathering and recording data
- Identifying and classifying
- Using equipment

- Planning and setting up different types of enquiries
- Reporting, presenting and communicating data/findings

Unit title	Working scientifically links
Materials	• Asking questions • Performing tests • Observing and measuring • Gathering and recording data • Identifying and classifying
Building things	• Asking questions • Observing and measuring • Gathering and recording data • Identifying and classifying
Changing materials	• Asking questions • Performing tests • Observing and measuring • Gathering and recording data • Identifying and classifying
Mixing and making	• Asking questions • Observing and measuring

	• Gathering and recording data • Identifying and classifying
Plants	• Performing tests • Observing and measuring • Gathering and recording data • Identifying and classifying
The animal kingdom	• Identifying and classifying
Human lifestyle	• Performing tests • Using equipment • Observing and measuring • Gathering and recording data
Habitats	• Identifying and classifying
Seasons and change	• Observing and measuring • Using equipment • Gathering and recording data
Space	NA
Sound	• Observing and measuring • Using equipment

Extraordinary scientists

- Asking questions
- Performing tests