Expectations for the end of each phase

We have high expectations for all children in our academy and our Scientific learning progression starting from Key Stage One is mapped out below. The statements below outline the expectations of children at the end of each phase of their education with us at Iceni.

Key Stage One Expectations – ages 5-7 (Years 1-2)

Working Scientifically:

- I can use appropriate Key Stage One scientific vocabulary.
- I can ask my own questions about what I notice.
- I can use different types of scientific enquiry to gather and record data, using simple equipment where appropriate to answer questions:
    - Observing changes over time
    - Noticing patterns
    - Grouping and classifying things
    - Carrying out simple comparative tests
    - Finding things out using secondary sources of information.
- I can communicate my ideas, what I have done and what I have found out in a variety of ways.

Scientific Content:

- I can name and locate parts of the human body, including those related to the senses and describe the importance of exercise, a balanced diet and hygiene for humans.
- I can describe the basic needs of animals for survival and the main changes as young animals, including humans, grow into adults.
- I can describe the basic needs of plants for survival and the impact of changing these and the main changes as seeds and bulbs grow into mature plants.
- I can identify whether things are alive, dead or have never lived.
- I can describe and compare the observable features of animals from a range of groups.
- I can group animals according to what they eat, describe how animals get their food from other animals and/or from plants, and use simple food chains to describe these relationships.
- I can describe seasonal changes.
- I can name different plants and animals and describe how they are suited to different habitats.
- I can distinguish objects from materials, describe the properties and group everyday materials and compare their suitability for different uses.

Key Stage Two Expectations – ages 7-11 (Years 3-6)

Working Scientifically:

- I can use appropriate Key Stage Two scientific vocabulary.
- I can describe and evaluate my own and others' scientific ideas related to topics in the national curriculum (including ideas that have changed over time), using evidence from a range of sources.

- I can ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions, recognising and controlling variables where necessary (i.e. observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests, and finding things out using a wide range of secondary sources).
- I can use a range of scientific equipment to take accurate and precise measurements or readings, with repeat readings where appropriate.
- I can record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- I can draw conclusions, explain and evaluate my methods and findings, communicating these in a variety of ways.
- I can raise further questions that could be investigated, based on my data and observations.

<u>Scientific Content:</u>

- I can name and describe the functions of the main parts of the digestive, musculoskeletal and circulatory systems; and describe and compare different reproductive processes in life cycles in animals.
- I can describe the effects of diet, exercise, drugs and lifestyle on how the body functions.
- I can name, locate and describe the functions of the main parts of plants, including those involved in reproduction and transporting water and nutrients.
- I can use the observable features of plants, animals and micro-organisms to group, classify and identify them into broad groups, using keys or other methods.
- I can construct and interpret food chains.
- I can describe the requirements of plants for life and growth; and explain how environmental changes may have an impact on living things.
- I can use the basic ideas of inheritance, variation and adaptation to describe how living things have changed over time and evolved; and describe how fossils are formed and provide evidence or evolution.
- I can group and identify materials, including rocks, in different ways according to their properties, based on first-hand observation; and justify the use of different everyday materials for different uses, based on their properties.
- I can describe the characteristics of different states of matter and group materials into this basis; and describe how materials change state at different temperatures, using this to explain everyday phenomena, including the water cycle.
- I can identify and describe what happens when dissolving occurs in everyday situations; and describe how to separate mixtures and solutions into their components.
- I can identify, with reasons, whether changes in materials are reversible or not.
- I can use the idea that light from light sources, or reflected light, travels in straight lines and enters our eyes to explain how we see objects and the formation, shape and size of shadows.
- I can use the idea that sounds are associated with vibrations, and that they require a medium to travel through, to explain how sounds are made and heard.
- I can describe the relationship between the pitch of a sound and the features of its source; and between the volume of a sound, the strength of the vibrations and the distance from its source.

- I can describe the effects of simple forces that involve contact (air and water resistance, friction), that act at a distance (magnetic forces, including those between like and unlike magnetic poles), and gravity.
- I can identify simple mechanisms, including levers, gears and pulleys,that increase the effect of a force.
- I can use simple apparatus to construct and control a series circuit, and describe how the circuit may be affected when changes are made to it; and use recognised symbols to represent simple series circuit diagrams.
- I can describe the shapes and relative movements of the Sun, Moon, Earth and other planets in the solar system; and explain the apparent movement of the sun across the sky in terms of the Earth's rotation and that this results in day and night.

Key Stage Three Expectations – ages 11-14 (Years 7-9)

By the end of year 7 we intend that all pupils will have covered topics that follow the programme of study from the National Curriculum document published 2013(updated 2015).
These topics are:

- Working Scientifically
- Cells, Organisation, Reproduction, Variation
- Health, Fitness and Disease
- Environment, Ecology, and Classification
- Atoms, Elements, Compounds and Mixtures
- Acid, Alkalis, and Chemical Reactions
- Particle Model and Solutions
- Matter
- Waves, Light and Sound
- Forces and their Effects

By the end of year 8 we intend that all pupils will have covered topics that follow the programme of study from the National Curriculum document published 2013(updated 2015).
These topics are:

- Working Scientifically – Exam and Graph Skills Unit
- Respiration, Food and Digestion
- Inheritance and Selection
- Plants, Photosynthesis and Food
- Earth Science
- Metals and their Reactions
- Chemical Energetics and Resources
- Energy Changes
- Electricity and Magnetism
- Forces at Work – Speed and Moments

We have split the Key Stage 3 topics so that the topics we teach in year 8 build on the knowledge that we have taught them in year 7.

In Year 9 for the first term we teach a transition curriculum. We intend to provide pupils with an opportunity to experience Science in real world applications/situations. The intent is to allow pupils to begin to see how Science is linked to many different areas of study that may wish to follow in the future. (Our long term plan is to teach all KS3 knowledge in this manner to build on the topic – based curriculum that they have experienced at KS2.
During this term the topics taught are:

- Anatomy (biology)
- Biomimicry (biology, chemistry, physics)
- Behaviour (biology, psychology)

Key Stage Four Expectations – ages 14-16 (Years 10-11)

We begin teaching the Key Stage 4 content In the January term of Year 9.

At Key Stage four we intend that all pupils will follow either the AQA Trilogy GCSE Syllabus or the AQA Triple GCSE Syllabus and leave with either a Combined GCSE in Science or a GCSE in Biology, Chemistry and Physics.
The content taught builds on the knowledge gained at KS3 and is taught in the following topics in the following order:

Year 9

- Energy
- Atomic Structure and the Periodic Table
- Cell Structure and Transport in cells
- Cell Division
- Plant Tissues, Organs and Systems
- Photosynthesis
- Bonding, Structure and Properties of Matter
- Animal Tissues, Organs and Systems
- Particle Model of Matter

These topics have been chosen and placed in this order because;
- the first 3 topics contain key concepts that are needed for the understanding of all subsequent topics.
- Pupils do not follow their options choices in Year 9 so we choose topics for year 9 that have little or no Triple content in and we teach it to all pupils if it is present.

Year 10

- Respiration
- Energy Changes and Formula
- Chemical Changes
- Atomic Structure
- Infection and Response
- Electricity
- Homeostasis and the Nervous System and Hormonal Coordination
- Rate and extent of Chemical Change
- Forces
- Reproduction and Variation
- Observing and recording Motion
- Development of understanding of Genetics and Evolution and Classification of living things.

Year 11

- Homeostasis and the Nervous System and Hormonal Coordination
- Rate and extent of Chemical Change
- Forces
- Reproduction and Variation
- Observing and recording Motion
- Development of understanding of Genetics and Evolution and Classification of living things
- Chemistry of Atmosphere and Using Earth's Resources
- Organic Chemistry and Chemical Analysis
- Waves
- TRIPLE ONLY Space
- Adaptation, Interdependence and competition. Organisation of an Ecosystem, Biodiversity and the effect of Humans
- Magnetism and Electromagnetism

As well as GCSE's in the subject we intend for all pupils to be inspired by science and see the potential benefits a Science education can bring to their everyday lives. We intend for pupils to leave our organization with a love of enquiry and the ability to analyse evidence not just take it at face value.