Concepts

Throughout our curriculum we will revisit nine scientific concepts and explore how the content relates to these principles:

1. **Categorisation** Scientists have made the study of science manageable by organising and classifying natural phenomena and living things. In the Early Years children will be introduced to this concept by sorting objects like leaves, shells, or rocks according to their characteristics; as they progress through school they will begin to use classification keys to identify specific plants and animals. They will learn that things can be classified in different ways, e.g. invertebrate/vertebrate, carnivore, herbivore, omnivore.
2. **Cause and effect.** Nature behaves in predictable ways. Searching for explanations is the major activity of science; effects cannot occur without causes. One way children can learn about cause and effect by observing the effect that light, water, and warmth have on seeds and plants. They will also investigate aspects such as the change in magnetic force over different distances.
3. **Systems.** A system is a whole that is composed of parts arranged in an orderly manner according to some scheme or plan. In science, systems involve matter, energy, and information that move through defined pathways. The amount of matter, energy, and information, and the rate at which they are transferred through the pathways, varies over time. Children begin to understand systems by tracking changes among the individual parts. In KS1, they will investigate the relationships between organisms in a simple eco-system through looking at food chains and begin to understand the importance of plants. As they enter KS2, children will be introduced to the various parts of the digestive system and discuss the role of each part. They will explore the interaction between different systems such as respiration and circulation during exercise. Later in KS2, they will look at the solar system and the relationships between the planets and stars.
4. **Scale.** Thermometers, rulers, and weighing devices help children see that objects and energy vary in quantity. Children will begin to understand that certain phenomena can exist only within fixed limits of size. In the Early Years they will use a magnifying glass to see and identify small creatures, imagining life that size. In Early KS2, they will consider the size of parts of the body in relation to each other. Later they will consider the difference between the temperature of the sun and temperatures on earth.
5. **Models.** We can create or design objects that represent other things. This begins by children understanding the difference between a diagram and a photograph/life drawing. Later they will make models of systems, such as the solar system.
6. **Change.** The natural world continually changes, although some changes may be too slow to observe. Rates of change vary. Children can be asked to observe changes in the position and apparent shape of the moon. Parents and children can track the position of the moon at the same time each night and draw pictures of the moon's changing shape to learn that change takes place during the lunar cycle. Children can also observe and describe changes in the properties of water when it boils, melts, evaporates, freezes, or condenses.
7. **Structure and function.** A relationship exists between the way organisms and objects look (feel, smell, sound, and taste) and the things they do. Children also can learn to infer what a mammal eats by studying its teeth.
8. **Variation.** To understand the concept of organic evolution and the statistical nature of the world, students first need to understand that all organisms and objects have distinctive properties. Some of these properties are so distinctive that no continuum connects them-for example, living and

non-living things, or sugar and salt. In most of the natural world, however, the properties of organisms and objects vary continuously. Young children can learn about this concept by observing and arranging colour tones.

9. **Diversity.** This is the most obvious characteristic of the natural world. In the Early Years pupils explore the many types of objects and organisms in the world. In KS1, youngsters need to begin understanding that diversity in nature is essential for natural systems to survive. Children can explore and investigate a pond, for instance, to learn that different organisms feed on different things.

At Padiham St Leonard's, the science curriculum is taught through units of work with Scientific themes:

- Plants
- Animals
- Environment
- Materials
- Sound
- Electricity
- Forces
- Light and Astronomy.

When planning these units, we will consider the contribution made through this aspect to developing FRUITS. Within particular units there will be opportunities to explore the contribution Science can make to solving global challenges such as climate change within the environmental unit or controlling disease within Health and the Circulatory System. When doing so we will explore opportunities for pupils to discuss the wider ethical dilemmas these present.