

Unit 6: Lessons 1 and 2 - Years 4,5 and 6
Lessons 3 and 4 - Years 5 and 6

Microscopes and Telescopes



Introduction to the unit:

Through the theme of microscopes and telescopes this unit explores two issues in investigative science:

- 1) Whether 'doing science' detracts from the beauty we feel is inherent in natural forms such as the rainbow;
- 2) Whether in investigative science our human 'thirst for knowledge' overrides true consideration for other life-forms, especially the very small.

In lesson 1 pupils learn how the use of telescopes and microscopes opens up the world of the very large and the very small; and that there are simple patterns in nature which relate to number as in the Fibonacci numbers. Pupils are introduced to the 'argument from design' which maintains that such patterns possibly indicate the presence of a Designer (God).

In lesson 2 pupils explore the relationship between science and beauty.

In lesson 3 pupils consider how we order other life-forms in terms of value, and develops empathic skills. The end of unit activity addresses the question, 'Is there anything which cannot be measured?' and briefly considers the impact of emotions and feelings upon the world.

Links to the RE NSNF

- 1.1 Belief and teachings (what people believe)
- 1.2 Practices and lifestyle (what people do)
- 1.3 Expression and language (how people express themselves)
- 2.1 Identity and experience (making sense of who we are)
- 2.2 **Meaning and purpose (making sense of life)**
- 2.3 **Values and commitments (making sense of right and wrong)**

Unit Aim:

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Science reveals to us the worlds of the very large and the very small. We are amazed by both – but is dedication to scientific knowledge enough?

Unit Objectives

- (1) To know that there are simple patterns in nature which can be described in terms of numbers.
- (2) To reflect on whether doing science makes us lose our sense of wonder and beauty.
- (3) To consider attitudes to other life-forms and begin to develop empathy for very small life-forms
- (4) To consider whether all things may be scientifically measured.

Key Questions

- (1) When we do science do we 'peep in at the windows of nature'?
- (2) Is the world beautiful before it is true?
- (3) How do I feel about other life-forms?
- (4) Is there anything that cannot be measured?

Prior Knowledge

This unit links to QCA:
4B Habitats
6A Interdependence and adaptation
6B Micro-organisms

<p>Links to the Science NC</p> <p>Sc1.1 Ideas and evidence in science Sc1.2 Investigative skills</p> <p>Sc2.1 Life processes Sc2.2 Humans and other animals Sc2.3 Green Plants Sc2.4 Variation and classification Sc2.5 Living things in their environment</p> <p>Sc3.1 Grouping and classifying materials Sc3.2 Changing materials Sc3.3 Separating mixtures of materials</p> <p>Sc4.1 Electricity Sc4.2 Forces and motion Sc4.3 Light and sound Sc4.4 The Earth and beyond</p>	<p>Key Quotes</p> <p>"We must know, we shall know," said Hilbert in his radio broadcast. Godel knew better. There are some things that we <i>cannot</i> know. <i>'The Magical Maze: seeing the world through mathematical eyes'</i> by Ian Stewart. (Hilbert had been asserting that 'true' and 'provable' are the same thing.)</p> <p>Nature's patterns are 'emergent phenomena'. They emerge from an ocean of complexity like Botticelli's Venus from her half-shell – unheralded, transcending their origins. They are...indirect consequences of the deep simplicities of nature. <i>'Nature's Numbers'</i> (Phoenix) author as above.</p> <p>Are we deceiving ourselves when we turn from creation to Creator, and say that God designed the world? If the intricate and beautiful aspects of nature arose by natural selection, can we still say God planned it? <i>'A Guide to Science and Belief'</i> by Michael Poole.</p> <p>All creatures act according to the laws of their specific species as laid down by the Creator. Therefore none should act unrighteously, thinking, 'It is I who is powerful'. <i>Mahabharata</i></p>	<p>Teacher Resources</p> <p>'The Magical Maze' (Phoenix) by Ian Stewart, Professor of Mathematics at Warwick University. Gives information on mathematical patterns, Fibonacci numbers and fractals. 'Microscopic Life' (Kingfisher Knowledge) by Richard Walker. www.allposters.co.uk/gallery for posters of spiral galaxies, Earth in space and Moon.</p> <p>Classroom Resources</p> <p>Lesson 1: spectacles, hand lenses, microscope, binoculars, telescope, or pictures of these. Lesson 2: artefacts or pictures of natural objects which we generally consider to be beautiful. Poster of the Moon. Lesson 3: images of microscopic life. Video: clips from 'Honey I shrunk the kids'.</p> <p>ICT opportunities</p>
<p>Links to other parts of the NC</p> <p>Speaking and Listening Literacy Numeracy Foundation subjects Thinking Skills Creativity SMSC</p>	<p>Learning Styles / Intelligences</p> <p>Visual / Auditory / Kinaesthetic Linguistic intelligence ("word smart"): Logical-mathematical intelligence ("number/reasoning smart") Spatial intelligence ("picture smart") Bodily-Kinaesthetic intelligence ("body smart") Musical intelligence ("music smart") Interpersonal intelligence ("people smart") Intrapersonal intelligence ("self smart") Naturalist intelligence ("nature smart")</p>	<p>Lesson 1: Use a search engine to access relevant web-sites and locate information. Use a digital microscope and display images on a computer screen : create repeating patterns using 'Paint'. (extension activity). Find fractal patterns on a web-site. Extend knowledge through exploring given web-sites (Fibonacci numbers). Lesson 2: Use given web-sites to access information on astronomy.</p>