

Unit 7: Year Group - Years 4,5 and 6

Pythagoras and the worlds as numbers



Introduction to the unit:

This unit concerns the nature of maths and centres on the question, 'Were numbers invented or discovered?'

In lesson 1, 'Invented or discovered?' pupils learn that the Ancient Egyptians used numbers for practical purposes, and interpret the meanings of INVENT and DISCOVER. They think about differences between 'zero' and 'nothingness'.

Lesson 2, 'Where do numbers come from?' introduces Pythagoras from Ancient Greece, and his belief that numbers and shapes have a deep universal meaning. In Lesson 3, 'What is perfect?' pupils see how Plato developed these ideas to imagine a perfect, invisible world beyond the world of our senses. *In other words, he caused a split in people's minds between the constantly changing natural world – that which concerns science – and the pure and spiritual world which he called 'The world of Forms'.*

Lesson 4, 'Do some things never change?' shows how Islam, with its great respect for Ancient Greek ideas, combines geometry and religion in art.

In the End of Unit Activity pupils refer back to the initial question, 'Were numbers invented or discovered?' and reflect on how they may have modified or extended their initial thoughts.

Many questions are asked in this unit, linking maths and science to spiritual and philosophical inquiry. It is far more important that pupils should recognise such questions exist, and to think about them, than it is for them to come to definitive 'answers', and they should be aware of this.

This unit links well to Unit 5 'Space and Time', lessons 1 and 2.

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:

To explore some deep questions about change and perfection connecting maths, science, religion and philosophy, and to bring out and extend ideas through discussion and personal reflection.

Unit Objectives

- (1) To think about numbers in new, deeper ways
- (2) To see a connection between numbers and the spiritual
- (3) To consider how numbers (as geometric shapes) may be used in art to convey spiritual meanings

Key Questions

- (1) Were numbers invented or discovered?
- (2) Are numbers real?
- (3) Do numbers go on forever?
- (4) Does perfect also mean unchanging?

Prior Knowledge

Lesson 1

Knowledge of place value (lesson 1)
Prior experience of tessellation/translation (lesson 4)

Lesson 4 links well to QCA RE Units 6B What is the role of the mosque? and 6F How do people express their faith through the arts?

<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 thing 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>An equation for me has no meaning unless it expresses a thought of God. <i>Srinivasa Ramanujan</i></p> <p>A physicist is a mathematician with a feeling for reality. <i>Norman Packard</i></p> <p>The essence and power of that (Pythagorean) vision lies in its all-embracing unifying character: it unites religion and science, maths and music...in an inspired and luminous synthesis. <i>Arthur Koestler in 'The Sleepwalkers'</i></p> <p>Although no man is completely wise in all respects he can love wisdom as the key to nature's secrets. <i>Pythagoras</i></p> <p>God created all things in six days because this number is perfect. And it would remain perfect even if the work of six days did not exist. <i>St Augustine in 'The City of God'</i></p> <p>The mind that constantly applies itself to geometry is not likely to fall into error. <i>Ibn Khuldun (in 'Geometric Patterns' by Robert Field.</i></p>	<p>Teacher Resources</p> <p>'A brief history of zero' by Kristen McQuillin at www.mediatinker.com/whirl/zero/zero.html <i>The Sleepwalkers (Arkana) by Arthur Koestler for the Pythagorean universe.</i> <i>The Constants of Nature (Vintage) by John D Barrow.</i> <i>Symmetries of Islamic Geometrical Patterns by Syed Jan Abas and Amer Shaker Salman.</i> www.islamicarchitecture.org for photographs of palace and mosque decoration. www.tranquilart.com presented by European Muslim artists exploring spirituality in modern times.</p> <p>Classroom Resources</p> <p>For an introduction to Islamic art for upper KS2: www.bbc.co.uk/religion/religions/islam/features/art/index.html</p> <p>Islamic Patterns (Dover Design Library) by J. Bourgoin. <i>Full of black-and-white tile patterns (repetitive polygons, interlocking triangles, stars and hexagons) ranging from simple to complex which are copyright-free, and can be used in many different ways.</i> 3-D Geometric Designs (Dover) by John Locke. <i>As above, but in 3-D.</i> Geometric Patterns from Islamic Art and Architecture (Tarquin Publications) by Robert Field. <i>Contains patterns from the Alhambra, the great Mosque at Cordoba, the Azem Palace in Damascus and the Central Mosque, Glasgow.</i> <i>Highly recommended.</i></p>
<p>Links to other parts of the NC</p> <p>Speaking and Listening <i>Literacy – story writing.</i> Numeracy – reasoning about numbers and shapes; ratio and proportion (years 5/6); numbers and the number system, line and reflective symmetry, reflection and translation. Foundation subjects – art and design; Islamic tile patterns, abstract art. 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") <i>Naturalist intelligence ("nature smart")</i></p>	<p>ICT opportunities</p> <p>Lesson 1: Use the internet to find an Egyptian number chart. Lesson 2: Use given web-sites to find out more about Pythagoras. Lesson 3: ICT link: Write a story about a child who is transported into a computer game and tries to convince the characters that their world is not real. Lesson 4: Use a computer graphics program to create and transform shapes. Use a digital camera to capture pupil designs.</p>