Scheme of Work

Course title	Mathematics from prehistory to the Middle Ages
Taught sessions	30 x 2 hours over 30 weeks (60 hours)
Time	TBA
Location	TBA
Tutor	Tutor
Course description and aims	This course is designed mainly for arts and humanities students who want to deepen their understanding of mathematics, its history and the ways in which it relates to the social, cultural and historical aspects of the development of the human race. The syllabus will cover various mathematical topics and techniques that will be introduced through original mathematical texts. Some topics are at GCSE level, others are higher. The aim of the course is to develop mathematical skills and to build an understanding of the impact and development of mathematics throughout history. The course also aims to show learners how mathematics is linked to other sciences (e.g. astronomy and physics) and to everyday life. It is also hoped that the learners will develop a wider world view, interdisciplinary knowledge and general knowledge, and an appreciation of other cultures.
Assessment	Learning will be assessed by observing presentations made by the learners. The learners can choose any topic from the history of mathematics (up to the Middle Ages) or they can choose from a list of recommended topics that will be disclosed at the beginning of the course. Learners are encouraged to include investigative and collaborative exercises in their presentations. A list of recommended reading will be available from the tutor.

Session	Topic	Mathematics topics covered	Resources	Assessment
1	**Introduction to the course.** Getting to know each other. Timeline. What is mathematics? What do we use it for? What could be the reasons for its invention? Introducing suggested topics for presentations.		Cards for the timeline Whiteboard List of suggested presentation topics	Observation
2	**Prehistoric mathematics.** Counting and the Ishango bone. Megalithic structures, incl. the astronomy and geometry of stone circles. Ancient burials.	Prime numbers. Different number systems (5, 10, 20). Measure (megalithic yard). Construction of circle, flat circle, ellipse. Pythagorean triples and right angled triangles. Astronomy: movement of the sun and the moon in the sky.	Pictures of the Ishango bone and others Photos and drawings of standing stones, stone circles, burial chambers PPT Paper, pencils, compasses, rulers	Observation Questioning Peer
3	**Egypt.** Primary sources of mathematical texts from ancient Egypt. The writing of numbers. The Rhind papyrus.	Place value and tally. Multiplication, division, addition, subtraction. Fractions, including unit fractions. Algebra.	Handouts: Egyptian numbers; problems from the Rhind papyrus. Calculators. PPT.	Observation Questioning Peer/self
4	**Egypt.** The Rhind papyrus.	Algebra, equations. Geometry: area, volume, Phythagoras' theorem. π.	Handouts: problems from the Rhind papyrus. Calculators. PPT.	Observation Questioning Peer/self
5	**Mesopotamia.**	Place value and tally.	Handouts: Mesopotamian	Observation

	Primary sources of mathematic al texts from ancient Mesopotamia. The invention of writing. The role of the scribe. Numerals in ancient Mesopotamia. Sexagesimal system then and now. Multiplication tables.	Sexagesimal numbers. Multiplication tables. Astronomy: calendar based on lunar months and the seven-day week (seven celestial objects with irregular movements).	numbers signs; multiplication tables. Calculators. PPT.	Questioning Peer/self
6	**Mesopotamia.** The Larsa tablet. Reciprocal tablet. Tablets involving quadratic equations. Plimpton 322.	Square numbers. Reciprocals. Quadratic equations. Pythagorean triples, right angled triangles.	Handouts: copies of reciprocal, quadratic, Larsa and Plimpton 322 tablets. Calculators. PPT.	Observation Questioning Peer/self
7	**China.** Sources of mathematical texts. Chinese numerals and counting rods. Magic squares. Word problems involving simultaneous equations. Pascal's triangle.	Multiplication, division. Magic squares. Simultaneous equations. Pascal's triangle.	Handouts: magic squares, word problems, Pascal's triangle. Counting rods. PPT.	Observation Questioning Peer/self
8	**India.** Hindu-Arabic numerals (including zero). Vedic and Jaina mathematics. Infinity and the size of the atom. Zero (Brahmagupta). Quadratic equations.	Hindu-Arabic numerals. Place value. Zero as a number, as opposed to a place holder. Infinity. Quadratic equations.	Handouts: Hindu-Arabic numerals, word problems. PPT.	Observation Questioning Peer/self
9	**India.** Aryabhata. Bhaskara II. Madhava and the Kerala School.	Trigonometry. π. The circumference of the Earth. Division by zero.	Handouts: diagrams, 1/x function, word problems. PPT.	Observation Questioning Peer/self
10	**Greece.** Attic/Herodianic numerals.	Zeno's paradox. Pythagorean tetractys.	Handouts: diagrams and pictures.	Observation Questioning

	Zeno. Pythagoras. Plato. Aristotle.	Pythagoras' theorem. Angle sum of a triangle. Ratio (mathematics in music). Platonic solids. Proof.	3D shapes. PPT.	Peer/self
11	**Greece/Hellenism.** Aristarchus. Eratosthenes.	Trigonometry: ratio of distances Earth-Sun and Sun-Moon. Astronomy: heliocentrism. Prime numbers (sieve of Eratosthenes).	Handouts: diagrams, list of prime numbers. PPT.	Observation Questioning Peer/self
12	**Greece/Hellenism.** Euclid.	Geometry: construction of an equilateral triangle, proof of Pythagoras' theorem. Prime numbers. Prime factors. Perfect numbers. Golden ratio. Mathematical proof.	Handouts: diagrams. Rulers, compasses. PPT.	Observation Questioning Peer/self
13	**Greece/Hellenism.** Archimedes. Diophantus. Hipparchus.	Geometry: area of the circle, π, volume and surface area of sphere and cylinder. Infinity (the number of grains of sand to fill the universe). Algebra: Diophantine equations. Trigonometry. Astronomy: the distance of the Moon from the Earth. Physics: Archimedes' principle.	Handouts: diagrams, word problems. PPT.	Observation Questioning Peer/self
14	**Rome.** Roman numerals. Roman abacus.	Roman numerals. Calculations with Roman numerals.	Handouts: list of Roman numerals, abacus sheets. PPT.	Observation Questioning Peer/self

15	**Islamic mathematics.** Al-Khwarizmi. Al-Karaji Omar Khayyam	Geometry: 2D symmetry. Algebra and geometry: quadratic and cubic equations. Pascal's triangle and binomial theorem. Lattice multiplication.	Handouts: geometrical patterns, word problems, diagrams, Pascal's triangle. PPT.	Observation Questioning Peer/self
16	**Mayan mathematics.** Sources (Dresden Codex etc.). Mayan numerals and number system. Mayan calendar systems. Astronomy in architecture (e.g. Caracol).	Vigesimal number system. Place value. Astronomy: the movement of the sun, the moon and the Venus.	Handouts: Mayan numerals, pictures and diagrams. PPT.	Observation Questioning Peer/self
17	**Medieval Europe.** Fibonacci.	Fibonacci sequence and its connection to: - the natural world - the golden ratio Lattice multiplication. Algebra. Fibonacci's identity.	Handouts: Fibonacci sequence, diagrams, pictures, word problems. PPT.	Observation Questioning Self/peer
18	Student presentation			Observation
19	Student presentation			Observation
20	Student presentation			Observation
21	Student presentation			Observation
22	Student presentation			Observation
23	Student presentation			Observation
24	Student presentation			Observation
25	Student presentation			Observation
26	Student presentation			Observation
27	Student presentation			Observation
28	Student presentation			Observation
29	Student presentation			Observation
30	Student presentation			Observation