

Chapter 8. European Mathematics, 500 to 1600

Study Guide

The following is a brief list of topics covered in Chapter 8 of Howard Eves' *Introduction to the History of Mathematics*, 6th Edition (Saunders College Publishing, 1990). This list is not meant to be comprehensive, but only gives a list of several important topics. You should also carefully study the proofs, constructions, and examples given in class, and the homework problems.

Section 8.1. “The Dark Ages” (The Middle Ages).

The Dark Ages/Middle Ages/Medieval Period and their rough dates, monasteries and learning, Acius Boethius (and his *Arithmetic*, geometry text, *Logica netus*, and *De consolazione philosophiae*), Bede (and his *De natura rerum*, *De temporum ratione*, *Historia ecclesiastica gentis Anglorum*), Aluin of York (and his Carolingian miniscule, and elementary mathematical texts), Gerbert of Aurillac (or Pope Sylvester II; he wrote texts for use in cathedral schools where he taught).

Section 8.2. The Period of Transmission.

The role of Latin translations in transmission, history of Toledo (Spain), Adelard of Bath (translations of Euclid's *Elements*, wrote books on arithmetic and astrolabe, translated al-Khwarizmi's astronomical tables, *De Eodem et Diverso*, *De Avibus Tractatus*, *Questiones Naturales*), Plato of Tivoli (translated Arabic works and Ptolemy's work, influenced Leonardo of Pisa), Bar Hiyya, Gherard of Cremona (translated around 80 works, had assistance, translated Archimedes/Aristotle/Euclid/al-Khwarizmi, translated Ptolemy's *Almagest* and its influence), role of Sicily in transmission, influence of Italian merchants, influence of Spain.

Section 8.3. Fibonacci and the Thirteenth Century.

Supplement. Leonardo of Pisa (Fibonacci) and the *Liber abbaci*.

Section 8.4. The Fourteenth Century. Black death/bubonic plague, Hundred Years' War, Nicole Oresme (Note 8.4.A: His biography, *De configurationibus qualitatum et motuum* [“On the Configurations of Qualities and Motions”], his coordinate geometry and its possible influence on

Descarte, *De proportionibus proportionum* and the first use of fractional exponents, *Livre du ciel et du monde* (['Book of Heaven and Earth'] and his opposition to a stationary Earth, summing a series), Thomas Bradwardine (Note 8.4.B: His biography, *De proportionibus velocitatum in motibus* ["Of the Proportions of Velocities in Motions"], his comments on Aristotle's views of objects in motion, *On "it begins" and "It ceases"* and his view of time intervals, *Speculative Geometry*, *Speculative Arithmetic*, *On the Continuum* and Democritus; atomic theory).

Section 8.5. The Fifteenth Century. The European Renaissance (Note 8.5.A: Italian Renaissance, Florence, perspective, classical sources of knowledge, fall of Constantinople and refugees bringing classical Greek works to Europe, Johannes Gutenberg and the printing press), Nicholas of Cusa (Note 8.5.B: His biography, his studies and involvement with the Church, calendar reform, *De docta ignorantia* ["On the Doctrine of Ignorance"], his mathematical writings, studies of the infinitely large and infinitely small, approximation of π , improvements on Ptolemy's predicted planetary positions, his spiritual and philosophical writings), Georg Peurbach (Note 8.5.C: His education and travels, *Theoricae Novae Planetarum* ["New Theories of the Planets"] and Ptolemy's epicycles, *Tabulae Ecclesium* ["Tables of Eclipses"], his partial translation of Ptolemy's *Almagest*, *Tractatus super propositiones Ptolemaei de sinibus et chordis* ["A Treatise on the Propositions of Ptolemy concerning Sines and Chords"], his contributions to mathematics and in particular trigonometry), Johann Müller/Regiomontanus (Note 8.5.D: His education, construction of astrolabes, completes Peurbach's translation of *Almagest*, brought Diophantus' *Arithmetica* to the attention of Europe, *De triangulis omnimodis* and solving triangles, spherical trigonometry, table of sines, his work in astronomy and observation of Halley's Comet, his printing press and he was the first publisher of scientific literature), Nicolas Chuquet (Note 8.5.E: *Le Triparty* as the first French algebra book and it includes zero, extraction of roots and irrational numbers, solving quadratics, the use of negative numbers), Luca Pacioli (Note 8.5.F: *Summa* covers arithmetic, algebra, money, weights and measures, bookkeeping, and geometry; symbols for plus and minus, representation of powers of an unknown, symbol for equals, quadratic equations, biography of Pacioli, *Divina proportione* with Leonardo de Vinci as illustrator, golden ratio/divine proportion, published a Latin translation of Euclid's *Elements*), Johannes Widman (Note 8.5.G: "Nimble and Smart Calculation for all Merchants," the first appearance of + and - used as signs).

Section 8.6. The Early Arithmetics. Arithmetic books/abbacus books, David Eugene Smith's *Rara Arithmetica* as a catalog of arithmetics, David Eugene Smith (Note 8.6.A: His biography, education, travel, and career; George Plimpton and his collection of arithmetics, his publications),

Treviso Arithmetic (Note 8.6.B: Earliest known print arithmetic, translated into English by David Eugene Smith, PAGE 5 after image...

Section 8.7. Beginnings of Algebraic Symbolism.

Section 8.8. Cubic and Quartic Equations.

Section 8.9. François Viète.

Section 8.10. Other Mathematicians of the Sixteenth Century.

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