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I. Why introduce primary sources?

> *"It appears to me that if one wants to make progress in mathematics, one should study the masters and not the pupils."*
>
> -Niels Henrik Abel

II. Classroom Examples

Approx. Date	Author	Most Relevant Source	Notes-Topics of Interest
550 B.C.	Pythagoras	*The Pythagorean Sourcebook and Library*; Kenneth Sylvan Guthrie, David R. Fideler [contains *Life of Pythagoras* by Iamblichus]	Gives mystical properties of numbers, uses symbolic Tetraktys, foundations of harmony, establishes importance of proof
300 B.C.	Euclid	*The Elements*; translation and commentary by Sir Thomas L. Heath *The Elements of Geometry*; side-by-side Greek-English edited by Richard Fitzpatrick	Axiomatic approach; Plane Geometry: Books I-VI, Number theory: Books VII-X, Solids: XI – XIII
287-212 B.C.	Archimedes	*The Works of Archimedes*; translated by Sir Thomas L. Heath	Spirals, Infinitesimals, Hydraulics, Leverage
262-200 B.C.	Apollonius	*Conics* (Books I, II, and III); translated by William H. Donahue (from Britannica's Great Books set) *Treatise on Conic Sections* (all books); translated by Sir Thomas L. Heath	Conic Sections
60-120	Nicomachus	*Nicomachus of Gerasa: Introduction to Arithmetic*; Britannica Great Books, vol. 11 *The Manual of Harmonics of Nicomachus the Pythagorean*; translation and commentary by Flora R. Levin	Pythagorean number theory; classifications of numbers
90-168	Ptolemy	*The Almagest*; translated by G.J. Toomer	Geocentric model, early trigonometry (chords)
200-280	Diophantus	*Diophantus of Alexandria: A Study in the History of Greek Algebra*; Sir Thomas L. Heath	Greek form of algebra; solving equations
245-325	Iamblichus?	*The Theology of Arithmetic*; translated by Robin Waterfield	Continuation of Pythagorean traditions giving symbolism to numbers
800	Al-Kwharizmi	*Robert of Chester's Latin Translation of Al-Khwarizmi: With an introduction, Critical Notes, and an English Version by Louis Charles Karpinski;* Martino Pulishing, 2007 *The Algebra of Mohammed Ben Musa (1831)*; translated by Friedrich August Rosen	Introduction of Hindu-Arabic numerals, modern approach to solving equations (balance method)
1175-1226	Leonardo Pisano (Fibonacci)	*Liber Abaci*; translated by Laurence Sigler	Introduces Arabic methods and numerals to Europe; Contains the problem that gives the Fibonacci sequence.
1473-1543	Copernicus	*On the Revolution of the Heavenly Spheres*; translated by Charles G. Wallis	Heliocentric model
1501-1576	Cardano	*The Rules of Algebra (Ars Magna)*; translated by T. Richard Witmer	Algebra approaches extended to classic number theory. Wrestling with solving cubic equations.
1540-1603	Viete	*The Analytic Art*; translated by T. Richard Witner	Move from rhetorical style toward symbolic presentation

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1564-1642	Galileo	*Sidereus Nuncius*; translated by Albert Van Helden *Dialogue Concerning the Two Principle Systems of the World*; translated by Stillman Drake	Galileo records observations through his telescope Through dialogue between two philosophers, Galileo compares the Ptolemaic system and Copernican system
1596-1650	Descartes	*Discourse on Method, Optics, Geometry, and Meteorology*; translated by Paul J. Olscamp [intended to be read together] *The Geometry of Rene Descartes with a facsimile of the first edition* [original text and English side-by-side]	Descartes links geometry and algebra using a coordinate approach to geometry.
1601-1665	Fermat	*The Mathematical Career of Pierre de Fermat*; Michael Sean Mahoney [I have not found a collection of his letters. This is as close as I could find.]	Extends analytical geometry. Develops probability/game theory (with Pascal). Builds foundation of the calculus. Extends number theory including the famous "last theorem."
1623-1662	Pascal	*Treatise on the Arithmetical Triangle*; Britannica Great Books, vol. 33 *Correspondence with Fermat on the Theory of Probabilities*; Britannica Great Books, vol. 33	Develops probability/game theory (with Fermat). Gives a curious triangular pattern of numbers (similar to the Pythagorean Tetraktys) used to give coefficients of binomial expansions.
1642-1727	Newton	*The Principia – Mathematical Principles of Natural Philosophy*; translated by I. Bernard Cohen and Anne Whitman	To explain planetary motion, develops a Calculus.
1646-1716	Leibniz	*The Early Mathematical Manuscripts of Leibniz*; translated by J.M. Child	Develops a Calculus independently of Newton. Formalizes notation that we continue to use. Uses sums of infinitesimals (the integral).
1707-1783	Euler	*Elements of Algebra*; translated by J. Hewlett	Summarizes all algebra to date in a very modern, symbolic form.
1777-1855	Gauss	*Disquisitiones Arithmaticae*; translated by Arthur A. Clark	Summarizes all number theory to date with new results.
1792-1856	Lobachevsky	*Geometrical Researches on the Theory of Parallels*; translated by George B. Halsted	Supposes an alternative meaning to parallel lines giving birth to non-Euclidean geometry.
1826-1886	Riemann, Poincare, et al.	*Beyond Geometry: Classic Papers from Riemann to Einstein*; Peter Pesic	Collection of essays concerning mathematics leading up to relativity.
1879-1955	Einstein	*Relativity: The Special and the General Theory*	Through thought experiments, Einstein questions Newtonian physics that time is absolute, gives an alternative theory of gravity, searches for a mathematical description "everything."

Authors and relevant works contained in Britannica Great Books set (about $1000):

Euclid, *Elements*
Archimedes, *The Works of Archimedes*
Apollonius, *Conics* (Books I, II, and III only)
Ptolemy, *The Almagest*
Nicomachus, *Introduction to Arithmetic*
Copernicus, *On the Revolutions of he Heavenly Spheres*
Galileo, *Dialogue on the Two Systems of the World*
Descartes, *Discourse on Rightly Conducting the Reason*
The Geometry
Pascal, *On Geometrical Demonstration*
Treatise on The Arithmetical Triangle
Correspondence with Fermat on the Theory of Probabilities

Some sites to find books in the public domain:

Bartleby.com at www.bartleby.com

The Cambridge digital library at http://cudl.lib.cam.ac.uk

Internet Archive at www.archive.org

The Internet Public Library at www.ipl.org

The Newton Project at www.newtonproject.sussex.ac.uk

Project Gutenberg at www.gutenberg.org

Rare Book Room at www.rarebookroom.org

Wilbourhall.org at www.wilbourhall.org

Check out university libraries in your area.

University of Louisville Libraries
The William Marshall Bullitt Collection of Rare Mathematics and Astronomy
(go to http://library.louisville.edu/library/ekstrom/special/bullitt/bullitt.html
to see a more complete list)

Some notable first editions in the collection:

Euclid, *Elementa*. Venice, Ratdolt, 1482. (first printed edition)

Descartes, *Discours de la Methode pour Bien Conduiree sa Raison et Chercher la Verite dans les Sciences*. Leyden, Maire, 1637.

Newton, *Philosophiae Naturalis Principia Mathematica*. London, Streater, 1687.
Contains Newton's handwritten corrections on an errata leaf.

Gauss, *Disquisitiones Arithmeticae*. Leipzig, Fleischer, 1801.

Einstein, *Entwurf Einer Verall Gemeinerten Relativitats – Theorie und Einer Theorie der Gravitation*. Leipzig & Berlin, Teubner, 1913.
Contains handwritten note from Einstein to Marshall Bullitt.