# BO1 History of Mathematics
# Lecture XV
# Historiography and Mathematics 1500–1900

MT 2021 Week 8

# Summary

Part 1

- Euclid re-re-visited
- Horse for courses: texts for readers
- Annotating Euclid

Part 2

- Periodisation of science and mathematics
- Mobilising history in 19th century French mathematics: Michel Chasles

# The mid-Renaissance (15th and 16th centuries)

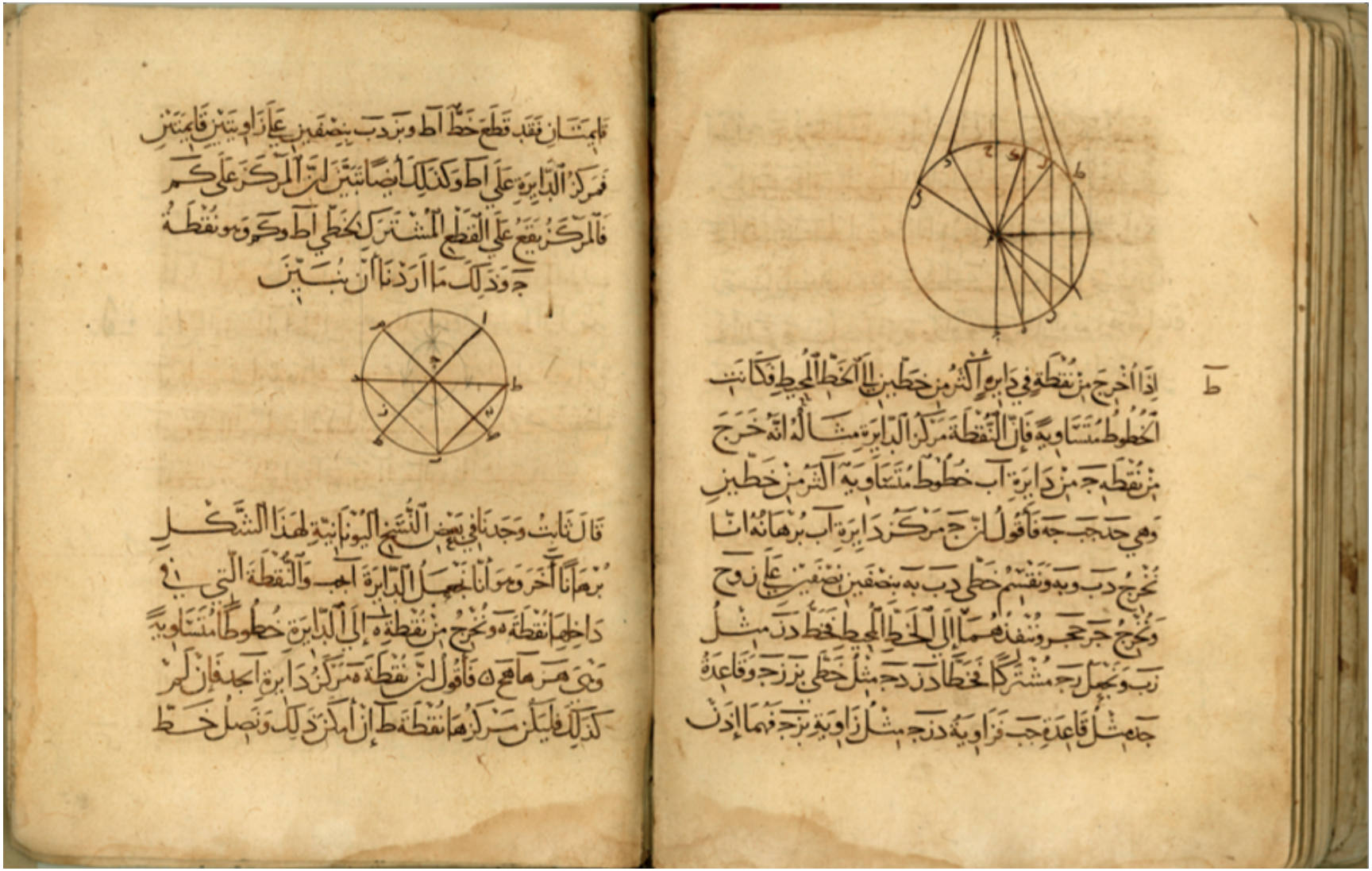
Classical mathematical texts more widely available due to:

- rediscovery of manuscripts
- revival of knowledge of Greek
- (Western) invention of printing (Gutenberg, c. 1436)

# Euclid's *Elements*: transmission history

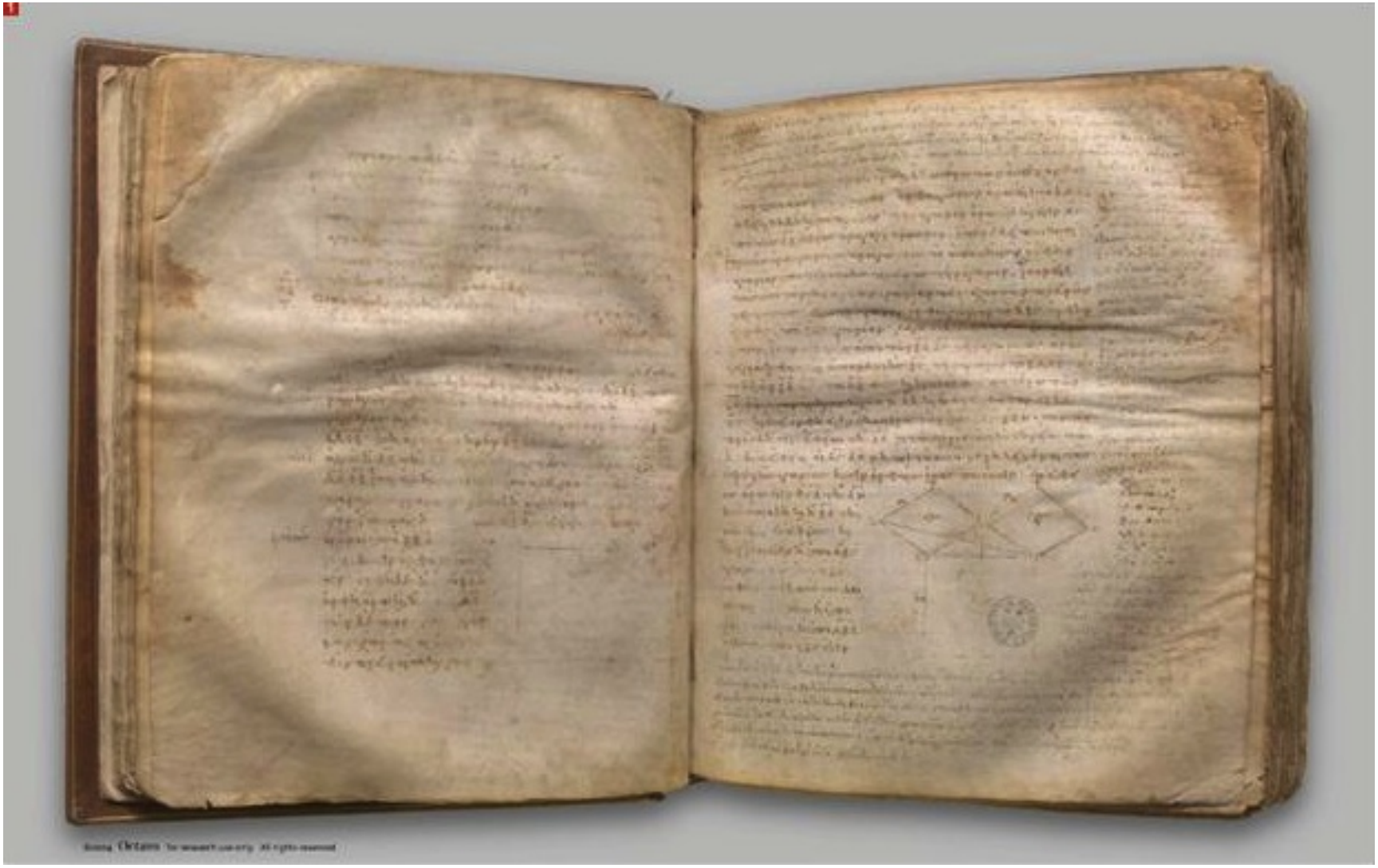
- commentaries written by Pappus (c. AD 320), Theon (c. AD 380), Proclus (c. AD 450)
- a few propositions in Boethius (c. AD 500)
- copies in Greek (earliest from Constantinople, AD 888)
- many translations or commentaries in Arabic (AD 750–1250)
- mediaeval translations from Arabic to Latin: Adelard of Bath (1130), Robert of Chester (1145), Gerard of Cremona (mid-12th century)
- printed editions in Latin or Greek from 1482 onwards

# Euclid in Arabic



Translated from the Greek by Ishaq ibn Hunayn, AD 1466

# Euclid I.47 from Bodleian ms. dated 888



Whole manuscript is digitised:
http://www.claymath.org/library/historical/euclid/

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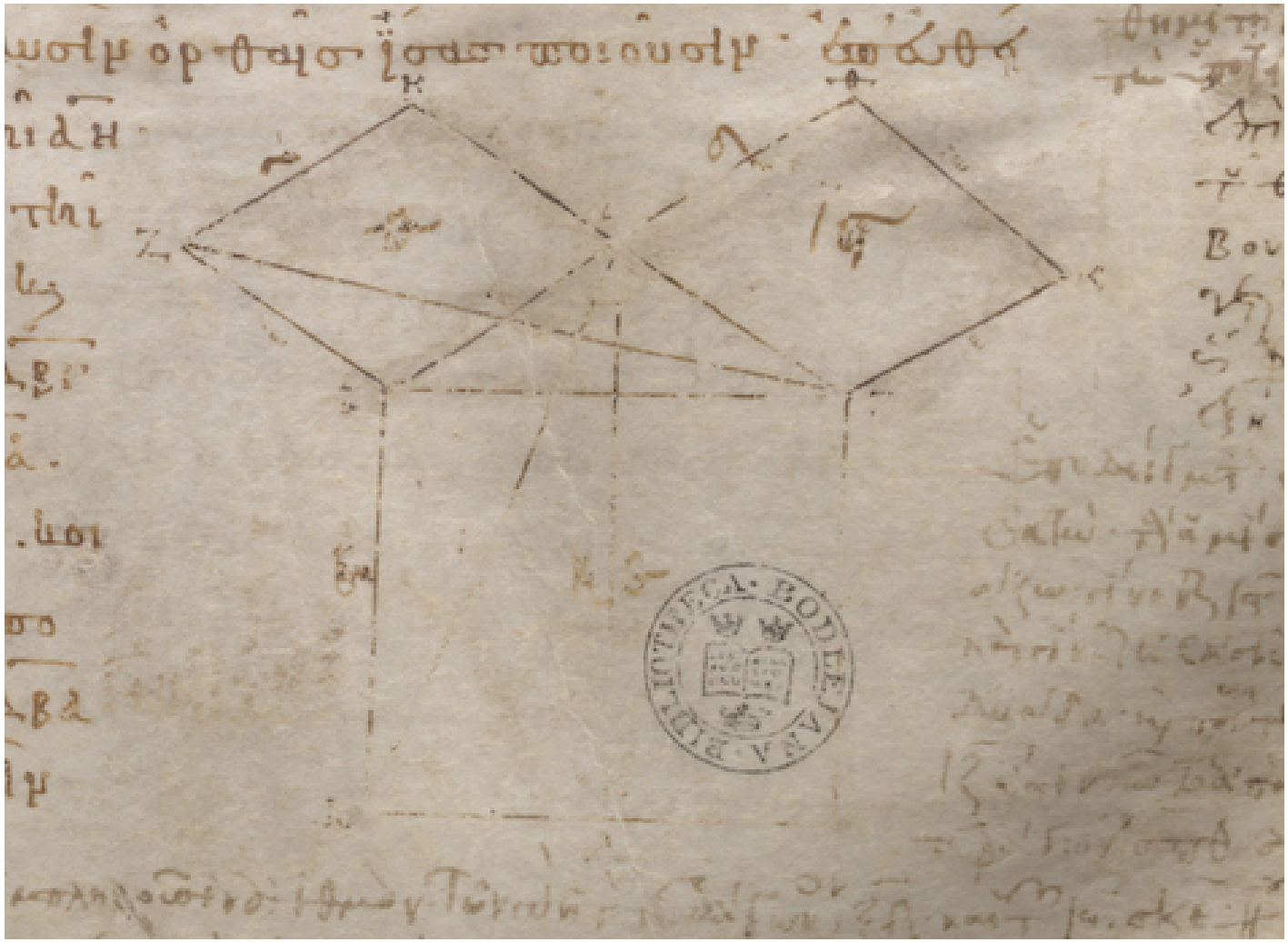

http://www.claymath.org/library/historical/euclid/files/elem.1.47.html

# Different texts for different readers

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- "I ventured to ask him about algebra and geometry, and begged him, the first time he went to Edinburgh, to buy me something elementary on these subjects, so he soon brought me "Euclid" and Bonnycastle's "Algebra", which were the books used in the schools at that time." - Somerville, c. 1790s.

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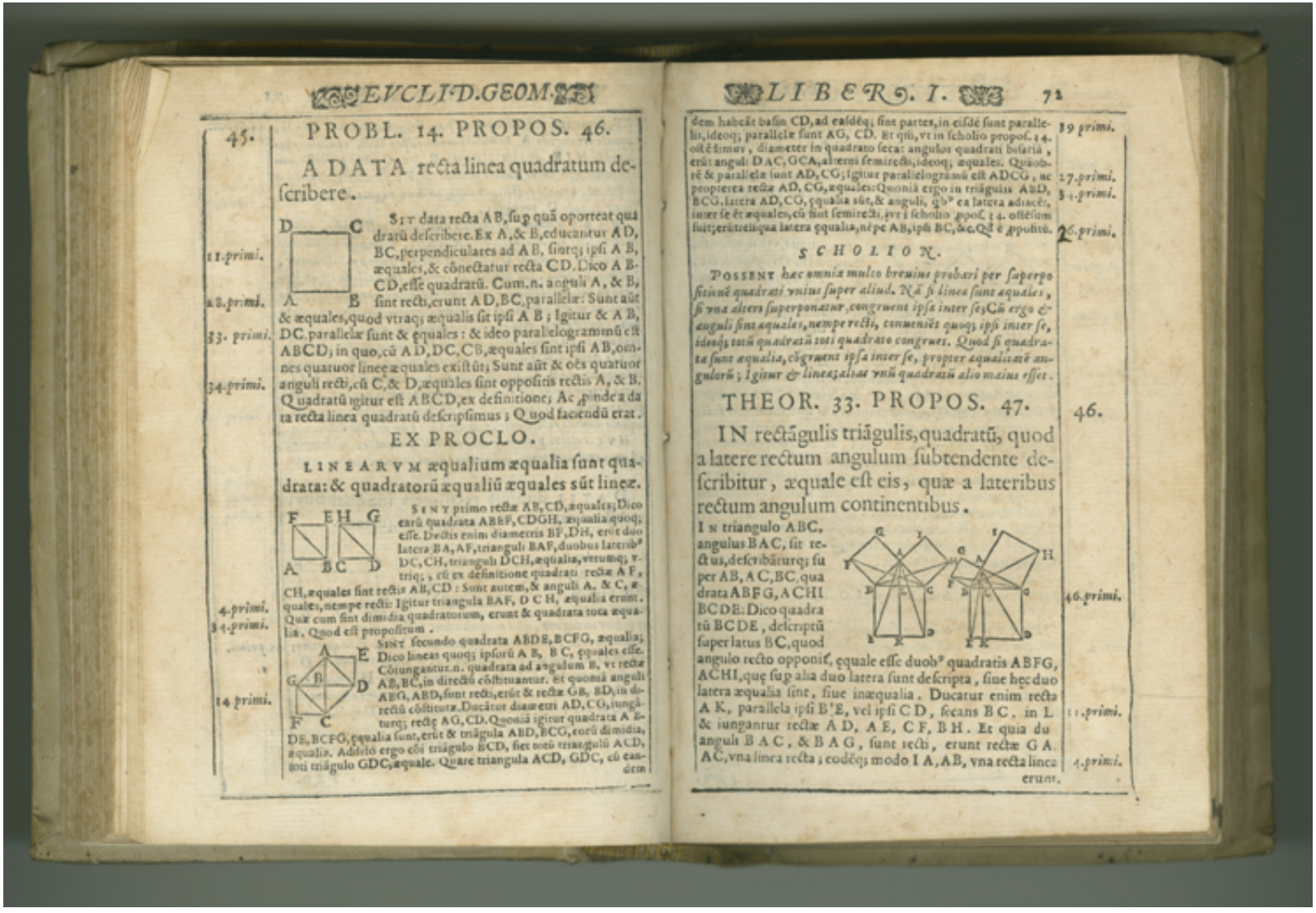

EVCLID. GEOM.

45. PROBL. 14. PROPOS. 46.

A DATA recta linea quadratum describere.

11. primi. 12. primi. 33. primi. 34. primi.

SIT data recta AB, sup quã oporteat quadratũ describere. Ex A, & B, educantur AD, BC, perpendiculares ad AB, sintq; ipsi AB, æquales, & cõnectatur recta CD. Dico AB-CD, esse quadratũ. Cum.n. anguli A, & B, sint recti, erunt AD, BC, parallelæ: Sunt aũt & æquales, quod vtraq; æqualis sit ipsi AB; Igitur & AB, DC, parallelæ sunt & æquales: & ideo parale logrammũ est ABCD; in quo, cũ AD, DC, CB, æquales sint ipsi AB, omnes quatuor lineæ æquales existũt; Sunt aũt & oẽs quatuor anguli recti, cũ C, & D, æquales sint oppositis rectis A, & B. Quadratũ igitur est ABCD, ex definitione; Ac, proinde a data recta linea quadratũ descripsimus; Quod faciendũ erat.

EX PROCLO.

LINEARVM æqualium æqualia sunt quadrata: & quadratorũ æqualiũ æquales sũt lineæ.

4. primi. 34. primi.

SINT primo rectæ AB, CD, æquales; Dico earũ quadrata ABBF, CDGH, æqualia quoq; esse. Ductis enim diametris BF, DH, erũt duo latera BA, AF, trianguli BAF, duobus lateribus DC, CH, trianguli DCH, æqualia, vterumq; vtriq;, cũ ex definitione quadrati rectæ AF, CH, æquales sint rectis AB, CD: Sunt autem, & anguli A, & C, æquales, nempe recti: Igitur triangula BAF, DCH, æqualia erunt. Quæ cum sint dimidia quadratorum, erunt & quadrata tota æqualia. Quod est propositum.

14. primi.

SINT secundo quadrata ABDE, BCFG, æqualia; Dico lineas quoq; ipsorũ AB, BC, æquales esse. Cõiungantur.n. quadrata ad angulum B, vt rectæ AB, BC, in directũ cõstituantur. et quoniã anguli ABG, ABD, sunt recti, erit & rectæ GB, BD, in directũ cõstitutæ. Ducatur diameter AD, CG, iungaturq; rectę AG, CD. Quoniã igitur quadrata ABDE, BCFG, æqualia sunt, erũt & trigula ABD, BCG, eorũ dimidia, æqualia. Addito ergo cõi triangulo BCD, fiet totũ triangulũ ACD, toti triangulo GDC, æquale. Quare triangula ACD, GDC, cũ eandem

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dem habeãt basin CD, ad eandẽq; sint partes, in eisdẽ sunt parallelis, ideoq; parallelæ sunt AG, CD. Et qm, vt in scholio propos. 14. ostẽsimus, diameter in quadrato secat angulos quadrati bifariã, erũt anguli DAC, GCA, alterni semirecti, ideoq; æquales. Quãobrẽ & parallelæ sunt AD, CG; Igitur parallelogrammũ est ADCG, ac proptereа rectæ AD, CG, æquales: Quoniã ergo in trigulis ABD, BCG, latera AD, CG, æqualia sũt, & anguli, qb⁹ ea latera adiacẽt, inter se ẽt æquales, cũ sint semirecti, vt i scholio propos. 34. ostensum fuit; erũt reliqua latera æqualia, nẽpe AB, ipsi BC, &c. Qđ ẽ ꝓpositũ.

39. primi. 27. primi. 34. primi. 26. primi.

SCHOLION.

POSSENT hæc omnia multo breuius probari per superpositionẽ quadrati vnius super alium. Nã si lineæ sunt æquales, si vna alteri superponatur, congruent ipsa inter se; Cũ ergo & anguli sint æquales, nempe recti, conueniẽt quoq; ipsi inter se, ideoq; totũ quadratũ toti quadrato congruet. Quod si quadrata sunt æqualia, cõgruent ipsa inter se, propter æqualitatẽ angulorũ; Igitur & lineæ aliter vnũ quadratũ alio maius essent.

THEOR. 33. PROPOS. 47. 46.

IN rectãgulis triãgulis, quadratũ, quod a latere rectum angulum subtendente describitur, æquale est eis, quæ a lateribus rectum angulum continentibus.

46. primi.

IN triangulo ABC, angulus BAC, sit rectus, describãturq; super AB, AC, BC, quadrata ABFG, ACHI, BCDE. Dico quadratũ BCDE, descriptũ super latus BC, quod angulo recto opponit, æquale esse duob⁹ quadratis ABFG, ACHI, quę sup alia duo latera sunt descripta, siue hęc duo latera æqualia sint, siue inæqualia. Ducatur enim recta AK, parallela ipsi BE, vel ipsi CD, secans BC, in L & iungantur rectæ AD, AE, CF, BH. Et quia duo anguli BAC, & BAG, sunt recti, erunt rectæ GA, AC, vna linea recta; eodẽq; modo IA, AB, vna recta linea erunt.

11. primi. 4. primi.

Euclid I.47 from Clavius, 1574.

# Annotating Euclid

Wardhaugh, B. (2021), 'Defacing Euclid: Reading and Annotating the Elements of Geometry in Early Modern Britain', IN: Anja-Silvia Goeing, Glyn Parry, and Mordechai Feingold, (eds) (2021), *Early Modern Universities*, Chapter 13 pp. 262–282.

ReadingEuclid.org

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- Collation of different editions or manuscripts
- Worked Exercises

# Annotating Euclid

**Copy-specific Notes**

Open note in new window **Notes for Bodleian Library: Auct. S 1.14** Binding: 17th century English (Oxford?) calf, blind tooled with evidence of chain-plate on upper board. Red and black sprinkled edges, no paste-downs, plain endleaves. - Note: Edward Bernard's customised Elements, 1690s. Edward Bernard (1638–1697), the Savilian professor of astronomy at Oxford, composed a polyglot working copy of the Elements by interleaving folios from the Basel 1533, Rome 1594, Pesaro 1619, and London 1620 editions. He was then able to annotate this copy towards his own edition, which was unfortunately never realised, although parts of it were used in the next Savilian professor David Gregory's edition published in 1703. - Note: The title-pages of all 4 editions that make up this 2 volume set appear in Auct. S 1.14, along with the earlier portion of each volume, interleaved to create a Harmony. The excecption is 1533 edition with the final 115 pages bound in here. - MS additions: Extensively annotated throughout by Bernard. - Provenance name: Bernard, Edward, 1638-1696, annotator. - Prev. shelfmark: K 1.16 Art. - Prev. shelfmark: M 6.10 Art. - Size: 29 cm.

Simon Grynäus (1493—1541), Greek edition of Euclid, printed in Basel in 1533.
See at SOLO.

# Part 2: Periodisation of Science and Mathematics

# Condorcet and the Progress of Mankind narrative

Ici le tableau commence à s'appuyer en grande partie sur la suite des faits que l'histoire nous a transmis : mais il est nécessaire de les choisir dans celle de différens peuples, de les rapprocher, de les combiner, pour en tirer l'histoire hypothétique d'un peuple unique, et former le tableau de ses progrès.

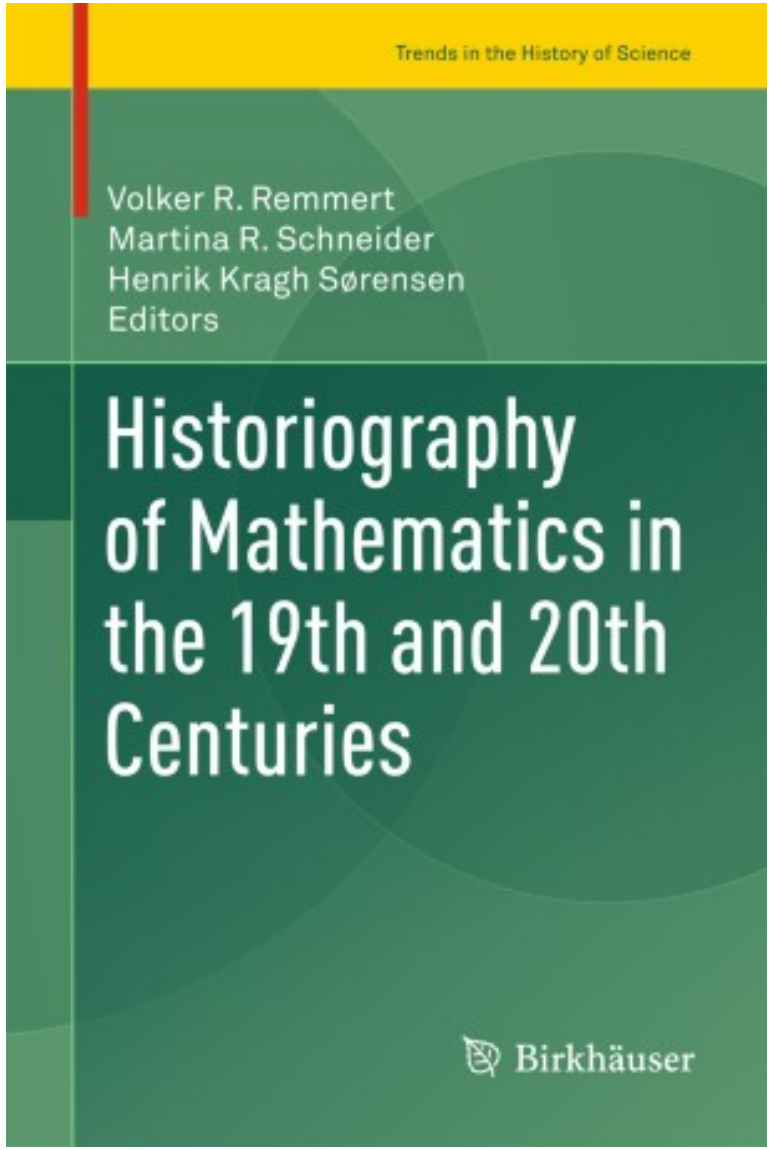
"it is necessary to choose [the facts of history] among those of several peoples, to bring them together, to combine them so as to derive from them a hypothetical history of only one people and to form a table of its advances."

Condorcet, 1795, *Esquisse d'un tableau historique*, Read on Gallica.

# Von Humboldt on Number Systems

M. de Humboldt a lu un *Mémoire* portant pour titre : *Considérations générales sur les signes numériques des peuples*. Il a comparé, dans ce Mémoire, les hiéroglyphes numériques des Mexicains aux hiéroglyphes égyptiens des nombres 1, 10, 100 et 1000, que le Dr Thomas Young a fait connaître dans son savant et ingénieux *Hieroglophical Vocabulary*. M. de Humboldt a examiné

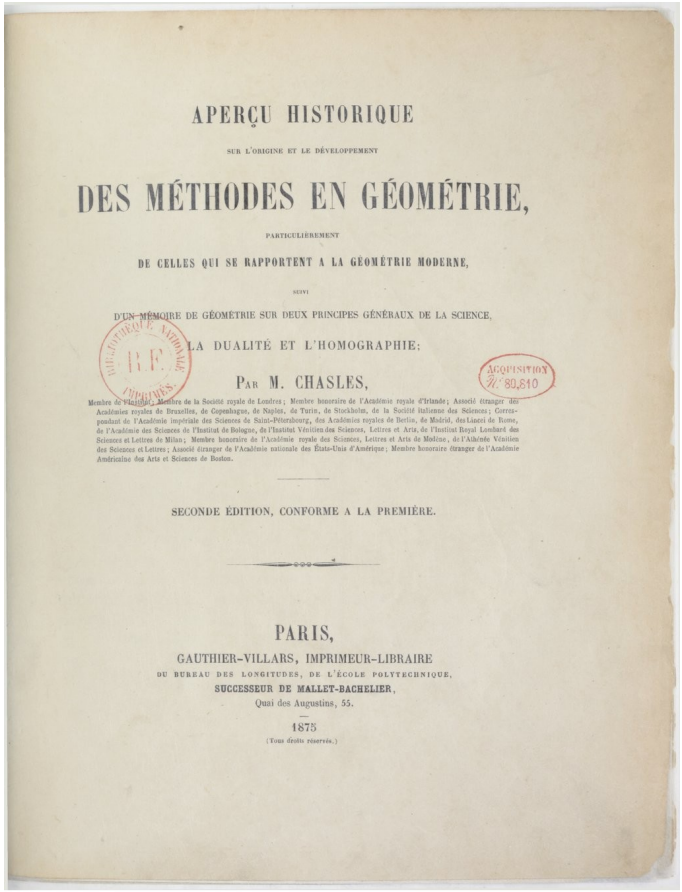
Read at Gallica.




Chapter 1, Maarten Bullynck. 'The History of Mathematics in the Progress of Mankind'. Find on Solo.

# Mathematics in the Archives - Michel Chasles

Michel, Nicolas, and Smadja, Ivahn. "Mathematics in the Archives: Deconstructive Historiography and the Shaping of Modern Geometry (1837–1852)." *The British Journal for the History of Science*, 2021, pp. 1–19.
Find on Solo.



APERÇU HISTORIQUE

SUR L'ORIGINE ET LE DÉVELOPPEMENT

DES MÉTHODES EN GÉOMÉTRIE,

PARTICULIÈREMENT

DE CELLES QUI SE RAPPORTENT A LA GÉOMÉTRIE MODERNE,

SUIVI

D'UN MÉMOIRE DE GÉOMÉTRIE SUR DEUX PRINCIPES GÉNÉRAUX DE LA SCIENCE,

LA DUALITÉ ET L'HOMOGRAPHIE;

PAR M. CHASLES,

Membre de l'Institut; Membre de la Société royale de Londres; Membre honoraire de l'Académie royale d'Irlande; Associé étranger des Académies royales de Bruxelles, de Copenhague, de Naples, de Turin, de Stockholm, de la Société italienne des Sciences; Correspondant de l'Académie impériale des Sciences de Saint-Pétersbourg, des Académies royales de Berlin, de Madrid, des Lincei de Rome, de l'Académie des Sciences de l'Institut de Bologne, de l'Institut Vénitien des Sciences, Lettres et Arts, de l'Institut Royal Lombard des Sciences et Lettres de Milan; Membre honoraire de l'Académie royale des Sciences, Lettres et Arts de Modène, de l'Athénée Vénitien des Sciences et Lettres; Associé étranger de l'Académie nationale des États-Unis d'Amérique; Membre honoraire étranger de l'Académie Américaine des Arts et Sciences de Boston.

SECONDE ÉDITION, CONFORME A LA PREMIÈRE.

PARIS,

GAUTHIER-VILLARS, IMPRIMEUR-LIBRAIRE

DU BUREAU DES LONGITUDES, DE L'ÉCOLE POLYTECHNIQUE,

SUCCESSEUR DE MALLET-BACHELIER,

Quai des Augustins, 55.

1875

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