

From Mariana, De ponderibus et mensuris, 1599

T 1 **Tabing, Johann** (1646–1695)

Tirocinia arithmetica, geometrica, sphærica, Cum appendice de Sciatericis quæ in usum collegiorum privatorum collegit.

Year: 1673 Place: Zerbst

Publisher: Johann Ern. Bezel

Edition: 1st Language: Latin

Figures: pages gilt-edged Binding: contemporary vellum

Pagination: pp. [164]

Collation: $)(^{4}A-B^{8}C^{4}a-d^{8}c^{2}(A)-(C)^{8}$

Size: 155x91 mm

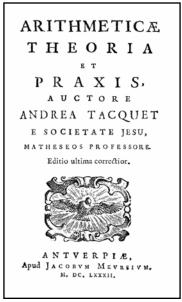
Tabing was a professor of mathematics at Zerbst, Saxony. He later taught in Bremen, became the head (*schulrector*) of a school in Emden and then returned to Bremen to become a professor of philosophy and Greek.

This work was published during the time when the author taught mathematics in Zerbst. He probably used it as a



text in his classes on arithmetic (the title page says it was used there but we cannot confirm this use). It begins with a discussion of the Hindu-Arabic numbers and relates these to the Roman numerals with nine examples. Any of the examples using numbers over 1,000 illustrate an interesting hybrid version of Roman numerals and place value notation: e.g., 123,456,789 = CXXIIIMCCCCLV IMDCCLXXXIX. The work continues with the simple arithmetic operations, fractions, series, extraction of roots and calculations of surface areas and the rudiments of plane and spherical trigonometry. After discussing the elements of astronomy, Tabing put it to use in a final section on the construction of sundials.

Illustrations available:
Title page
Illustration of Roman numerals



T 2

T 2 **Tacquet, Andreas** (1612–1660)

Arithmeticæ theoria et praxis

Year: 1682 Place: Antwerp Publisher: Jacob Meurs Edition: unknown Language: Latin

Figures: 1 engraved folding plate Binding: contemporary leather Pagination: pp. [8], 384, [4] Collation: *4 A–Z⁸ 2A⁸ 2B²

Size: 153x95 mm

Tacquet was a Jesuit professor of mathematics in Antwerp. He is known to have written elementary textbooks for use in Jesuit colleges and a few advanced mathematical works.

This arithmetic was first published in 1665 and was popular enough that editions were available well into the eighteenth century. There would appear to be no record of this 1682 edition. **DeMorgan** (*Arithmetical books*) notes an English edition with no date but presumably from the early 1700s. The work consists of two parts, the first being a version of Books 7, 8 and 9 of Euclid and the second a practical arithmetic. It is notable for containing both the galley and the modern forms of division and for a description of Napier's bones.

Illustrations available: Title page Napier's bones



T3

Tagliente, Giovanni Antonio e Girolamo (16th Century)

Libro dabaco che insegna a fare ogni ragione mercadantile: & a pertegare le terre con larte di la geometria: & altre nobilissime ragione straordinarie co[m] la tariffa come respondeno li pesi & monede de molte terre del mondo co[n] la inclita citta di Vinegia. El qual libro se chiama thesauro universale: diligentemente revisto & corretto.

Year: 1535 Place: Venice Publisher: Alvise Torti Edition: 7th (?) Language: Italian

Figures: title in red and black; engravings in text

Binding: contemporary vellum

Pagination: ff. [80] Collation: A–K⁸ Size: 145x96 mm

Reference: Rcdi BMI, Vol. II, p. 484; Smi Rara, p. 114

The Tagliente brothers (Giannantonio, or Govanni Antonio, and Girolamo) produced this mercantile arithmetic in 1515. It went through more than twenty-five editions—the present (1535) edition is unrecorded.

More than one book dealer has commented that this work has a misleading title (Libro dabaco = book of the abacus) because it does not cover the abacus. The title is typical of the early arithmetic books in Italy (few of which even mention the abacus), and can be traced back to at least Fibonacci's Liber Abaci of 1205. The work bears a resemblance to the earlier Filippo Calandri arithmetic, Pictagoris arithmetrice introductor ..., Florence, 1491 (q.v.) in that it uses similar, unsophisticated woodcuts to illustrate the problems. It begins with numeration (including the finger numeral system attributed to Bede) and then covers the four basic arithmetic operations. The structure of the work is unusual in that it describes multiplication and division before dealing with addition and subtraction. Tagliente then turns to the subject of fractions, illustrated by practical problems taken from commerce. In dealing with multiplication, it illustrates several very complex systems that would seemingly do more to confuse students than to enlighten them (see illustrations). The popularity of the work, despite its strange ordering of the material, can be judged from its many editions. **Smith** (*Rara*) remarks that

... there were few textbooks as influential as this in shaping the subsequent teaching of arithmetic.



Fontispiece, T 3

The frontispiece on the verso of the title page shows a class being taught by a master while a student illustrates the use of dividers on an armillary sphere.

Illustrations available:

Title page (color)

Frontispiece

Colophon

Multiplication systems (3)

Final page

Problem illustrations



Problem illustration, T 3

Γ4

Tailfer, Robert (1710-a.1736)

True and correct tables of time: calculated for the old stile for 784 years viz. from A. D. 1300, to 2083, both inclusive; and for the new stile, from its commencement viz. 1582 to 2083 inclusive, being 501 years.

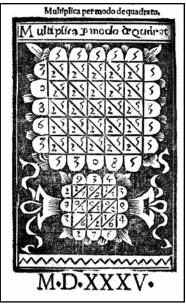
Year: 1736 Place: London Publisher: unknown Edition: 1st Language: English

Figures: engraved frontispiece

Binding: contemporary speckled calf gilt; marbled endpapers

Pagination: ff. [12] Size: 216x131 mm





Multiplication example and colophon date, T 3

Tailfer was a British naval officer who at the time of preparing these tables was not on active duty at sea (a *half-pay officer*). A book dealer's description of this work mistook the *half-pay officer* dscription and indicated that he was a paymaster.

The tables are designed to ease the conversion between dates on the Gregorian calendar (not yet officially adopted in Britain when these tables were published) and the Julian (Old Style) calendar. Tailfer begins with a short history of the development of the Gregorian calendar and then provides three tables: the first giving the dominical letter for each year from 1300 to 2083, the second relating the days of the week to the dominical letter for each month of the year, and the third relating the

1664	692	1720	748	776	Bag	1832	1860	888	1916	1944	1972	2000	2028	ags
65	93	25	49	77	5	33	61	89	17	45	73	,	29	5
66	94	22	50	78	6	34	62	90	18	46	74	2	30	5
67	95	23	51	7.9	7	35	63	91	19	47	75	3	31	50
68	96	24	52	80	8	36	64	92	20	48	76	4	32	6
69	97	25	53	81	9	37	65	93	21	49	77	5	.33	6
70	98	26	54	82	10	38	66	94	22	50	78	6	34	6
71	99	27	55	83	11	39	67	95	95	51	79	7	35	6
72	1700	28	56	8,4	12	40	68	96	24	52	80	8	36	6
73	1	20	57	85	13	41	69	97	23	53	81	9	37	6
74	2	30	58	86	14	42	70	98	26	54	82	10	38	6
75	3	31	59	87	15	43	71	99	27	55	83	11	39	6
76	4	32	60	88	16	44	72	1900	28	56	84	12	40	6
77	5	33	61	89	17	45	73		29	57	85	13	41	6
78	6	34	62	90	18	46	74	2	30	58	86	14	42	7
79	7	35	63	91	. 19	47	75	3	31	59	87	U	43	7
80	8	36	64	92	20	48	76	- 4	32	60	88	16	44	7
81	9	37	65	93	21	49	77	5	33	61	89	17	45	7.
84	10	38	66	94	22	50	78	6	34	62	90	18	46	7
83	11	39	67	95	23	51	79	7	35	63	91	19	47	7.
84	12	40	68	96	24	52	80	8	36	64	g_2	20	48	7
85	13	41	69	97	2,5	53	81	9	37	65	93	21	49	7
86	14	42	70	98	26	54	82	10	38	66	94	22	50	7
87	15	43	71	99	27	55	83	II	39	67	95	23	51	75
88	16	44	72	800	28	36	84	f2	40	68	96	2.4	52	8
89	. 17	45	73	- 1	29	57	85	13	41	69	97	25	53	8
90	18	46	74	2	30	58		14	42	70	98	26	34	8
régr	1719	1747	775	1803	1831	1859	1337	1915	1943	1971	1999	2027	2055	205

T 4

epact and golden number for each year in both the Old Style and the Gregorian systems. This data is sufficient to calculate any desired calendrical information.

The entire work is engraved rather than typeset. The engraving was done by George Bickham a well-known writing master.

Illustrations available:
Title page/preface and frontispiece
Sample table page

T 5

Taisnier, Joannes (1509–1589)

De uso annuli sphærici libri tres in quibus quicquid ad geometriæ perfectionem requiritur continentur.

Year: 1550 Place: Palermo

Publisher: Petruccio Spira and Antonio Anay

Edition: 1st Language: Latin Binding: modern vellum Pagination: ff. [2], 29, [1] Collation: A-G⁴H⁴ (H4 Blank)

Size: 211x152 mm

Reference: Mort HFB, #492; Weil, 29, #169

Joannes Taisnier was a Flemish physician, astrologer and mathematician. He evidently had multiple talents because he was also said to be a musician in the court of Charles V (to whom the book is dedicated and whose arms appear on the verso of the title page). He also taught mathematics in the universities of Rome, Ferrera, Venice, Padua, Florence and Palermo.



The surveying rings (essentially *Astronomer's Rings*, see **Dryander**, **Johannes**; *Annulorum Trium*, 1558) are pictured on the title page, and the component parts, in more detail, are inside the book. The use of the rings is illustrated with a number of woodcuts—these are unusual in that most are dated 1549, and several are signed or show the engraver's monograms.

This book nicely illustrates two different transitions. The first is the development of standard instruments for artillery, and the second the introduction of Hindu-Arabic numerals into Europe. It was only eight years after the publication of this work that **Tartaglia** introduced the gunner's quadrant, thus making obsolete the aiming of artillery with devices such as these rings (see **Tartaglia**, **Nicolo**; *Scientia Nova*, 1550). The confusion introduced by the use of Hindu-Arabic numbers is most easily seen in the dates on the illustrations (portions of which are backwards) and in the one place where Roman and Hindu-Arabic notation are used together in a table giving latitudes of various cities and ports.

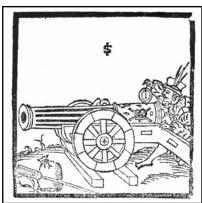
Illustrations available:

Title page

Woodcut with strange date

Aiming artillery

Tables of latitudes with mixed Roman and Arabic numerals



Aiming artillery, T 5



Interesting date, T 5

Macedoniæ.	Minoris Aphrice.				
Antigenia xli Lemnos infula xl. Scyros infula xxxviiii	Ammonis Vtica carthago chayrum Mosslum	xxxii. 3z 3z 30 Xi			

Mixed notation, T 5

Т 6

Tapis, Vincent César

Tables de nombres fixes, pour opérer les principales réductions étrangères avec la France

Year: 1751 Place: Lyon

Publisher: Pierre Valfray

Edition: 1st Language: French

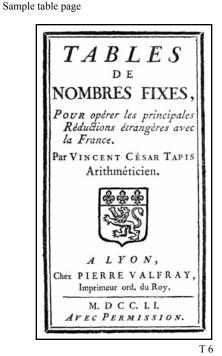
Binding: contemporary leather; marbled endpapers

Pagination: pp. [2], 80, [2]

Collation: A–G⁶ Size: 155x85 mm

This is a small book of tables relating the money used in Lyon to that used in other major centers of Europe (Amsterdam, London, Turin, etc.).

Illustrations available: Title page



Tapp, John

See **Phillippes, Henry**; The sea-mans kalendar: or, an ephemerides of the sun, moon, and certain of the most notable fixed stars.

T 7

Tartaglia, Nicolo Fontana (1501–1559)

La nova scientia inventa da Nicolo Tartalea B

Year: 1537 Place: Venice

Publisher: Stephano da Sabio

Edition: 1st Language: Italian

Figures: engraved frontispiece plus many illustrations

Binding: modern vellum Pagination: ff. [48] Collation: π^4 A–L⁴ Size: 201x146 mm

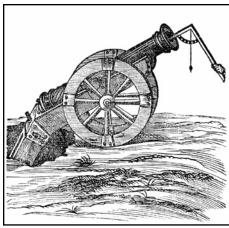
Reference: Drake GMC, p. 34; Rcdi BMI, Vol. I, p. 496

Nicolo Fontana, better known as Tartaglia, was born in Brescia and raised in poverty by his widowed mother. He adopted the nickname *Tartaglia* (*the stutterer*). He had a severe speech problem caused when, at the age of twelve, he received head wounds from a French soldier's sword as he and his mother were seeking shelter from the invaders in a church. At the age of fourteen he was taught to write, but poverty forced him to give up paying a tutor, and from then on he was self-educated. Sometime between 1516 and 1518, he moved to Verona, where he became a tutor in mathematics, and in 1534 he was appointed a professor of mathematics in Venice. Mindful of his earlier poverty, he provided public instruction in mathematics in a Venetian church. He is best known for work on the solution of equations.

The *new science* of this work deals with the fundamental mathematics of ballistics. Even before Tartaglia's time,



T 7

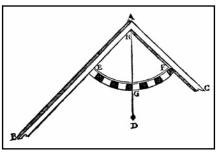


Gunner's quadrant in use, T 7

artillerymen had known, based on observation, that a cannonball flies in a curve. However, theoretical treatments were based on right-angle triangles (that assumed the ball flew in a straight line and then dropped vertically onto its target) because the mathematics of curves were as yet too difficult to be used.

Tartaglia's work on ballistics was stimulated in 1531, when an artilleryman asked him at what angle of elevation does a cannon shoot farthest? He correctly answered 45 degrees and then went on to investigate the flight of a cannonball more thoroughly. He incorrectly concluded that the path consisted of three parts: an initial straight line when the ball was propelled from the gun by the explosion of the gunpowder, a curved segment as it began to slow and lastly another straight line of flight as it fell to the ground (see illustrations of ballistic curves). In an early instance of scientific morality, Tartaglia initially refused to publish his results because he thought it unreasonable to teach Christians how to better kill their brothers. In 1537, as Venice was being threatened by the Turks, Tartaglia had a change of heart and published this work as his contribution to the fight against the infidels.

The work is divided into two parts, the first dealing with both practical and theoretical ballistics and the second with military survey problems. Tartaglia describes an instrument, the gunner's quadrant, used to accurately set



Gunner's quadrant, T 7

the elevation of the guns. He then adds sights and better scales to produce a military surveying instrument. The gunner's quadrant (see illustrations of the instrument and its use in a cannon) was equipped with a plumb bob and scale marked in *points* of elevation (usually twelve). A gun elevated at 45 degrees was said to be at *point 6 range*. When horizontal, the plum bob would cut the zero point on the scale—however, since the points were marked in Roman numerals, which have no zero, the position was simply left blank. Hence we have the term *point blank range*. Even after the general acceptance of the Hindu-Arabic numerals, the tradition of leaving the zero point blank on cannon elevation scales remained and this feature can often be seen on the sides of cannons dating from as late as the nineteenth century.

The title page shows an allegorical scene of two walled enclosures. The first, containing cannons and mortars firing and showing Tartaglia surrounded by the goddesses of arithmetic, geometry, etc. Euclid is shown guarding the gate and only admitting those he feels worthy of the knowledge inside. A smaller enclosure, only accessible from the first, shows the goddess of philosophy on a throne. This gate is guarded by both Aristotle and Plato, the latter holding in his hand a scroll saying that entry was barred for anyone not expert in geometry.

Illustrations available:

Title page

Gunner's quadrant instrument

Gunner's quadrant in use (elevation point 6)

Gunner's quadrant in use (elevation point 4)

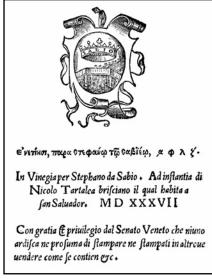
Ballistic curves showing the greatest range being at an

elevation of 45 degrees

Survey quadrant

Survey quadrant in use

Colophon



Colophon, T 7

Tartaglia, Nicolo Fontana (1501–1559)

La nova scientia ... con una gionta al terzo libro.

Year: 1550 Place: Venice

Publisher: Nicolo de Bascarini

Edition: 3rd Language: Italian

Binding: modern red leather; gilt spine; dentelle inner edges

Pagination: ff. [4], 32 Collation: π^4 A–H⁴ Size: 206x160 mm

Reference: Drake *GMC*, p. 34; Rcdi *BMI*, Vol. I, p. 496; Ben

GW, p. 20

This edition of *La nova scienta* has been reset from the original, but the illustrations appear identical. It is augmented at the end by the addition of a short description of a surveying instrument similar to a plane table, with a surveyor's cross.

Illustrations available:

Title page Colophon

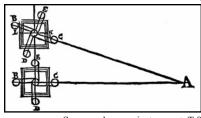
Additional surveying instrument



T 8

flone per che tai ponti,ouer minuti uengono a esferpartitore, et ogni minimo errore chese faccianel partitoreno poco sa uariar lo aucuimento. IL FINB Stampatain Venetia per Nicolo de Bascarini a ssantia de PAutore. 1 5 5 0.

Colophon, T 8



Surveyor's cross instrument, T 8

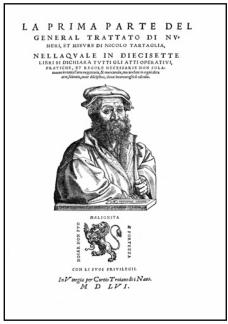
T 9

Tartaglia, Nicolo Fontana (1501–1559)

La prima [-sesta] parte del general tratto di numeri, et misure di Nicolo Tartaglia, nellaquale in diecisette libri si dichiara tutti gli atti operativi, pratiche, et regole necessarie non solamente in tutta l'arte negotiaria, & mercantile, ma anchor in ogni altra arte, scientia, over disciplina, doue interuenghi il calculo.

Year: 1556–1560
Place: Venice
Publisher: Curtio Troiano dei Navo
Edition: 1st
Language: Italian
Binding: original vellum over boards
Pagination: v.1: ff. [6], 277, [4], 186; v.2: ff. [4], 51, [1], [4],
63, [1], [4], 90, [4], 44
Collation: v1: π⁶Λ–2Υ⁶2Ζ^{7*4}Λ–2H⁶; v2: Å⁴Λ–H⁶1⁴Å⁴
Λ–K⁶1.⁴Å⁴Λ–P⁶Å⁴Λ–F⁶G⁸
Size: v.1: 286x210 mm v.2: 304x206 mm

This work, consisting of six parts (here bound in two volumes whereas it is usually found bound in three volumes), is a very major work on all aspects of arithmetic. Tartaglia attempted to record everything known about the subject in his day. This is not a textbook but rather is a reference work. Its nature is apparent from the start. Like most arithmetics, it begins with numeration, but it does not cover the usual subjects of numerals; rather, it starts with unusual forms such as tally sticks. In dealing with arithmetic operations, Tartaglia gives several different processes for many of them and illustrates each with complex examples—the illustration for galley division results in an obvious galley (see illustration).



Т9

The six volumes cover all aspects of arithmetic from roots, to areas, surveying, gauging and many theoretical problems. **Smith** (*Rara*) indicates that

...there is no other treatise that gives as much information concerning the arithmetic of the sixteenth century, either as to theory or application. The life of the people, the customs of the merchant, the struggles to improve arithmetic are all set forth by Tartaglia in an extended but interesting fashion.

The printing is excellent, with the diagrams and examples being closely integrated with the text. A series of large decorated capitals introduce each major topic, and miniature decorated capitals are used freely—sometimes several per page.

Tartaglia was not shy about his own portrait. The engraving of him on the main title page reappears several times, usually associated with the start of each major part of this work.

Illustrations available:

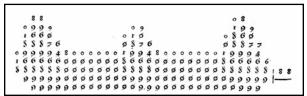
Title page (parts 1, 2, 3, 4, 5, 6)

Tally sticks

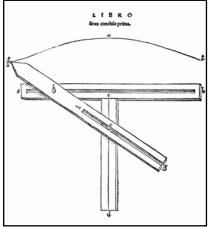
Galley division

Page with miniature decorated capitals, etc.

Drawing instrument



Galley division, T 9



Drawing instrument, T 9

T 10 Tartaglia, Nicolo Fontana (1501–1559)

Quesiti, et inventioni diverse

Year: 1546 Place: Venice

Publisher: Venturino Ruffinelli

Edition: 1st Language: Italian

Figures: 1 large folding plate Binding: contemporary vellum Pagination: ff. [6], 5–132, Collation: A⁶B–2K⁴ Size: 201x143 mm

Reference: Ben *GW*, p. 20

This work is arranged as a series of questions and answers, many of them with Richard Wentworth, Tartaglia's English pupil. This work is often considered to be Tartaglia's most important contribution to mathematics because in the last section he describes his solution for finding the roots of a cubic equation. While being famous for this single description, the work also contains a number of other notable features. The first two sections contain modifications to the ballistic arguments he had earlier published in Nova scientia, and this treatment of military mathematics continues in sections three to six. Included here is a description of his new surveying instrument (like a surveyor's cross), which he included in the second (1550) edition of his Nova scientia, as well as descriptions of new instruments for aiming guns even when the bore is not properly centered. The last



T 1

Fine delli, questit & inventioni diverse de Nicolo Tartalea Bristieno.

RECISTRO DI TYTTA L'OPERA.

ABCDEFGHIKLM NOPQRSTY XYZ.

AABBCC DD EEFFGGHHIKK.

Tutti sono Duerni.

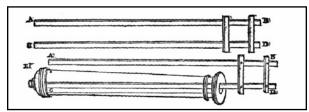
Stampato in Venezia per Venturino Ruffinelli ad instantia et requisitione,
& a proprie spese de Nicolo Tartalea Bristiano Autore. Nel
mess di Luio L'amou dinostra slatuta. D. XLVI.

Colophon, T 10

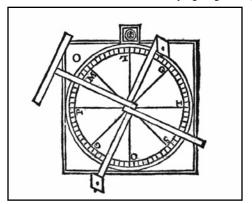
three parts deal with statics and algebra. This volume is unusual in that it contains the plate showing the instruments. Instructions for creating these devices are given in the text, and they include cutting out the pictures in the plate—thus, the plate having survived is extremely rare. Most copies of this work, unlike the present one, do not contain the two leaves of the table of contents—for this reason, the material from these leaves is included in the illustrations.

Illustrations available:

Title page
Table of contents (3)
Plate of instruments (3)
Artillery sighting devices
Surveyor's cross
Colophon and register



Artillery sighting device, T 10



Surveyor's cross, T 10

T 11 [Taulane, Jean]

Tresor d'arithmetique des marchands et des geometres. Divise' en deux parties. La premiere contient l'arithmetique vulgaire, dans laquelle il est traite" des quatre regles generales en nombres entriers, & rompud; des parties aliquotes & aliquantes 8. 12. 16. 20. & de 24. Borderaux de monnoye & de marchandise, des regles de trois droite, du change, d'interest, & d'encompte, de celles de trois inverse, de compaignie, de troque, d'aliage & de celle de deux fausses positions, avec la maniere d'extraire la racine quarree. La seconde contient l'algebre avec la resolution de diverses questions, apliquees tant sur les affaires du commerce, que sur le lignes, plans & corps solides.



T 11

Year: 1689 Place: Marseille

Publisher: Chez Claude Garcin

Edition: 1st Language: French

Binding: contemporary leather Pagination: pp. [viii], 63, [1], 95, [1]

Collation: A⁴A–H⁴A–M⁴ Size: 215x160 mm

This is an arithmetic designed to give practical instruction to apprentice merchants. It is divided into two sections. The first concerns arithmetic and begins with the basic operations before considering the more advanced topics such as fractions, profit margins, exchange rates, etc. The second section is devoted to practical aspects of algebra and geometry. Each section contains commercial examples, three of which are illustrated with small vignettes.

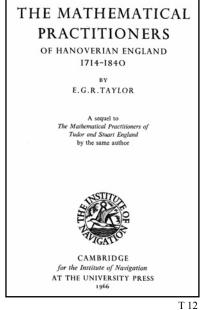
Illustrations available:

Title page

Vignette of cloth merchant and apprentice



Cloth merchant illustration, T 11



T 12

Taylor, Eva Germaine Rimington (1879–1966)

The mathematical practitioners of Hanoverian England 1714-1840

Year: 1966 Place: Cambridge

Publisher: Cambridge University Press

Edition: 1st Language: English

Figures: photolith frontispiece, 6 double-sided photolith plates

Binding: original cloth boards Pagination: pp, xi, 503 Size: 215x137mm

This is a companion work to Taylor's earlier Mathematical practitioners of Tudor and Stuart England. It is organized along the same lines as that other work (see that entry). The frontispiece is a portrait of Bernard Le Bovier de Fontenelle.

Illustrations available: Title page Frontispiece

T 13

Taylor, Eva Germaine Rimington (1879 – 1966)

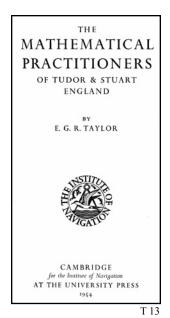
The mathematical practitioners of Tudor & Stuart England

> Year: 1954 Place: Cambridge

Publisher: Cambridge University Press

Edition: 1st Language: English

Figures: photolith frontispiece, 5 double-sided photolith plates, 2 photolith plates, 2 folding plates



Binding: original cloth boards Pagination: pp. xii, 443 Size: 218x135 mm

Taylor (who is best known by her initials, E. G. R., rather than by her given names) was a professor of geography at the University of London. She had already retired when this work was published, but she obviously led an active research life with this and other projects.

This is one of the standard references for biographical and other background material on English mathematical practitioners (defined by the author as ... lesser menteachers, text-book writers, technicians, craftsmen ... a great name does here and there appear, as when without loss of dignity a Thomas Hariot shows the sailor how to manage his cross-staff or an Isaac Newton polishes his own speculums). It covers the period from 1485 to 1715. The work is divided into three sections: the first being a general survey of mathematics and mathematical practitioners, the second a biographical sketch of each person, and the third a short description of the works published by each of her practitioners. The frontispiece shows the instrument maker Elias Allen in his workshop.

Illustrations available: Title page Frontispiece

T 14

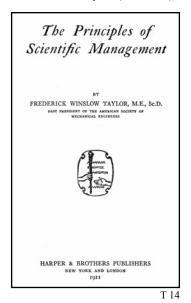
Taylor, Frederick Winslow (1856–1915)

The principles of scientific management

Year: 1911 Place: New York



Frontispiece (Elias Allen), T 13



Publisher: Harper & Brothers

Edition: 1st Language: English

Binding: original cloth boards; gilt-stamped spine and front cover

Pagination: pp. 144 Size: 221x144 mm

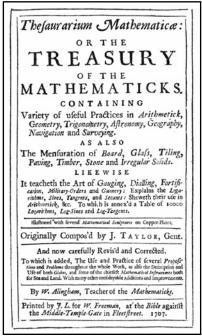
Reference: DSB XIII, pp. 271-272

Taylor was an engineer with the Bethlehem Steel Works in Philadelphia. He is often credited with the invention of the *time and motion study* of scientific management.

This work is based on his experiences at the steel works. In it, he attempts to establish that all our daily acts are performed in an inefficient way, that the solution to this problem is systematic management and that the best management techniques are a true science. He first

wrote this paper for presentation to the American Society of Mechanical Engineering in 1910. It was printed for private circulation among the members of the ASME in 1911, and then a trade edition was produced later the same year. The private printing can be distinguished from the trade edition by the fact that it contains an additional foreward and a three-page appendix. This copy is a trade edition.

Illustrations available: Title page



T 15

T 15 **Taylor, John** (fl.1650–1701) - [**William Allingham** (fl.1694–1710), editor]

Thesaurarium mathematicæ: or the treasury of the mathematicks containing variety of useful practices in arithmetick, geometry, trigonometry, astronomy, geography, navigation and surveying. As also the mensuration of board, glass, tiling, paving, timber, stone, and irregular solids. Likewise it teacheth the art of gauging, dialling, fortification, military-orders and gunnery; explains the logarithms, sines, tangents, and secants; sheweth their use in arithmetick, &c. To which is annexed a table of 10000 logarithms, log-sines and log-tangents.

Year: 1707 Place: London Publisher: J. L. for W. Freeman Edition: 3rd

Language: English

Figures: engraved frontispiece

Binding: contemporary leather; rebacked Pagination: pp. [8], 364, [92] Collation: A⁴B–Z⁸2A⁶2A–2L⁴2M²

Size: 188x119 mm

Reference: Hend BTM, #53, pp. 71, 207

Taylor was an astrologer and teacher of mathematics in Norwich. He is known to have published another arithmetic book and an annual almanac for Norwich.

This is a textbook on mathematics that Taylor undoubtedly used in his teaching. Like many authors of the era, he repeats the polite fiction that he had written it for his own private use but then had been persuaded by friends to publish it. It had first been published in 1686, reedited in 1693, and then printed again in 1707 with the addition of a work on mathematical instruments (globes, sector, quadrant, gauging rod, Coggeshall's rule, etc.) by William Allingham. The work is practically oriented and would have been a useful text. The frontispiece is an interesting portrait of the author.

Illustrations available: Title page Frontispiece



Frontispiece (John Taylor), T 15

T 16 **Taylor, Michael S.** (1756–1789)

A sexagesimal table, exhibiting at sight, the result of any proportion, where the terms do not exceed sixty minutes. Also tables of the equation of second difference, and tables for turning the lower denominations of English money, weights and measures into sexagesimals of the higher, and vice versa. And the sexagesimal turned into seconds as far as the 1000th column, being a very useful millesmal table of

proportional parts. With precepts and examples useful for astronomers, mathematicians, navigators, and persons in trade.

b/w: **Bernoulli, John III**; A sexcentenary table; exhibiting at sight, the result of any proportion, where the terms do not exceed 600 seconds or 10 minutes with precepts and examples.

Year: 1780 Place: London

Publisher: William Richardson

Edition: 1st Language: English Figures: 1 folding plate

Binding: contemporary half-bound leather marbled boards;

rebacked; red leather label Pagination: pp. xlvi, [2], 316 Collation: a-m²A-4K² Size: 284x229 mm

This sexagesimal table, the largest ever published, was designed as an aid in the division of numbers. As all the major divisions of both circles and time are in the sexagesimal scale (despite the attempt by the French to create decimal divisions), these systems proved to be a problem to scientific calculation. The simple operations of addition and subtraction were of little difficulty but multiplicative operations were both tedious and very error-prone. These tables helped solve that problem. Much the same situation was seen in the twentieth century when the problem of multiplication and division of complex numbers resulted in the development of one of the first great computing machines, the Bell Laboratories Complex Number Calculator (see entry for AFIPS [Andrews, Ernest Galen]; A review of the Bell Laboratories digital computer developments).

Illustrations available:

Title page Sample table page Sample page from monetary table

	1. Of Money. 1 L.=1'.									
To t		To turn Sexagefimals of a Pound into Shillings, Pence, and Farthings.								
S	//	1	1	s d	111	1	Pènce			
I	3 6	1	1	0.4			0,06			
2			2	0.8	1:	2	0,13			
3 4 5	9		3	1.0		3	0,2			
4	12		4	I . 4	1	+	0,26			
	15		5	1.8		5	0,3			
6	18		6	2.0	7	5	0,4			
7 8	21	9	7	2 . 4		7	0,48			
	24		78	2 . 8		3	0,58			
9	27		9	3.0			0,6			
10	30	I	0	3 · 4	I		0,6			
11	33	I	I	3 . 8	11		0,73			
12	36	1	2	4.0	12	2	0,8			
13	39	1	3	4 · 4	1	3	0,86			
14	42		4	4 . 8	12		0,93			
15	45	I	5	5.0	14	5	1,0			
16	48	I	6	5 · 4	16	5	1,06			

Sample table, T 16

SEXAGESIMAL TABLE, EXHIBITING, AT SIGHT, THE RESULT OF ANY PROPORTION, WHERE THE TERMS DO NOT EXCEED SIXTY MINUTES. TABLES OF THE EQUATION OF SECOND DIFFERENCE, TABLES FOR TURNING THE LOWER DENOMINATIONS ENGLISH MONEY, WEIGHTS, AND MEASURES, SEXAGESIMALS OF THE HIGHER, AND VICE VERSÁ. SEXAGESIMAL TABLE TURNED INTO SECONDS
AS FAR AS THE IOOOTM COLUMN,
Being a very wifeful MILLESIMAL TABLE of proportional Parts. PRECEPTS AND EXAMPLES. Ufcful for Aftronomers, Mathematicians, Navigators, and Perfons in Trade, MICHAEL TAYLOR. PUBLISHED BY ORDER OF COMMISSIONERS OF LONGITUDE. Printed by William Richardson, in the Strand, Printer,

AND 10 D N:

C. Norre, in the Strand, and McM. Modern and Page, on Tower-Hill,

Bookfillers to the field Commissioners. M DCC LXXX.

T 16

T 17 **Taylor, Michael S.** (1756–1789) [**Nevil Maskelyne** (1732–1811)]

Tables of logarithms of all numbers, from 1 to 101000; and of the sines and tangents to every second of the quadrant ... With a preface and precepts for the explanation and use of the same, by Nevil Maskelyne ...

Year: 1792 Place: London

Publisher: Christopher Buckton for Francis Wingrave

Edition: 1st Language: English

Binding: contemporary leather Pagination: v.1: pp. [16], 64, [68], [378] Collation: v.1: $a-d^2a-q^2A-R^2A-4Z^25A-5B^25C^1$

Size: 360x288 mm

Michael Taylor had been a computer employed by the Commissioners of Longitude to work on the calculations for the *Nautical Almanac* and other publications.

Taylor died shortly before these logarithms could be published, and Nevil Maskelyne, the Astronomer Royal, took on the remaining steps of readying them for the press. There were only five pages remaining to be proofread when Taylor died. The logarithms, like most such tables, were not recalculated but instead were interpolated from those of **Adriaan Vlacq**. Nevertheless, they represented a significant advance because Taylor had interpolated the **Vlacq** trigonometric tables to every second of arc. Maskelyne added a sixty-three-page introduction that not only explained the use of logarithms but also provided tables of formulae for the solution of different problems in plane and spherical trigonometry. The tables were no

doubt very useful, but because of their size, they would have been awkward to use.

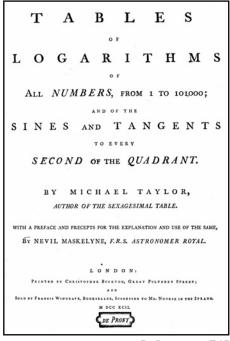
The distinction of these tables may be appreciated from the extensive subscribers' list that includes not only the major astronomical observatories of Europe but also the leading scientists of the day.

A second copy of these tables is part of the collection, this one bound in two volumes—the logarithms of numbers in one and the trigonometrical logarithm tables in another. This second set is of particular interest because of its provenance—it was first owned by the astronomer Le Monnier then by the famous table maker **Gaspard de Prony**, with his inscription.

Illustrations available:

Title page

Title page of the de Prony copy



De Prony copy, T 17

Taylor, Norman H.

See AFIPS; Evaluation of the engineering aspects of Whirlwind I. In Proceedings of the Joint AIEE-IRE Computer Conference. Review of electronic digital computers. Papers and discussions presented at the Joint AIEE-IRE Computer Conference, Philadelphia, PA., December 10–12, 1951, pp. 75–78.

Tennulio, Samuel, translator

See **Iamblichus**; In Nicomachi Geraseni arithmeticam introductionem et de fato nunc primum eeditus ...

Terry, George Skelton

Duodecimal arithmetic

Year: 1938 Place: New York

Publisher: Longmans, Green and Co.

Edition: 1st Language: English

Binding: original cloth; with dust jacket

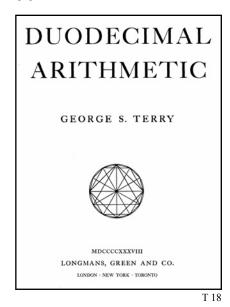
Pagination: pp. [8], 407 Size: 291x235 mm

Nothing is known of the author other than the fact that he lived in Hingham, Massachusetts.

The normal decimal number system is based on powers of 10. The duodecimal system is similarly based on powers of 12. In this work, the author attempts to show the natural superiority of the base 12 system (for one thing, 12 has more divisors than 10 and thus is better suited when problems arise in division, conversion of fractions into duodecimals, etc.). In order to show this superiority, Terry has produced standard numerical tables in base 12. These include: tables for conversion of decimal numbers to duodecimal, factorials, reciprocals and powers of duodecimal numbers, roots, trigonometrical functions and logarithms of both duodecimal numbers and trigonometric functions.

This copy was signed by the author and inscribed with the signature of A. C. Aitken, a famous numerical analyst from Edinburgh University. Several copies of the syllabus for Aitken's *Course of Practical Work in the Mathematical Laboratory* are inserted.

Illustrations available: Title page



T 19

Teutoburg, Ernst Friderich von

Der Erfährte Hahn Oder Kurze Vorstellung des ienigen, was muhmassenlich von dem aussgang dieses bluyigen Kriegs zu hoffen, ob Granckreich sein vorgesetztes ziel erreichen werde?

b/w: **Faulhaber, Johann**; *Ulmensis miracula* arithmetica. Zu der continuation seines arithmetischen wegweisers gehörig, 1622.

Year: 1678 Place: Freystatt Edition: 1st Language: German

Figures: engraved frontispiece Binding: contemporary boards Pagination: pp. [6], 88 Collation:):(³A–L⁴ Size: 192x153 mm

This is a political tract purchased simply because it was bound before the work of **Faulhaber**.

Illustrations available:

None

T 20

Thacher, Edwin (1839–1920)

Directions for using Thacher's calculating instrument

Year: 1914 Place: New York Publisher: Keuffel & Esser Edition: 5th Language: English

Binding: original paper wrappers

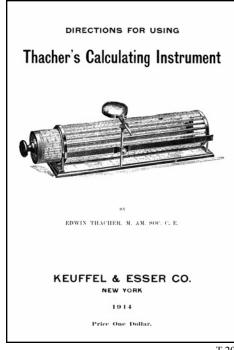
Pagination: pp. 74 Size: 222x145 mm

Thacher was an engineer from New York who specialized in the design of bridges.

Most ordinary slide rules are from five to twenty inches long and will yield answers having from two to four digits, depending on both the length of the slide rule and the portion of the scale being used. In order to get more significant figures, one must make the slide rule longer, but doing that quickly creates an unworkable instrument. Thacher took logarithmic scales thirty feet long and broke them into manageable sections affixed to a cylinder mounted in a metal framework. This system was relatively easy to use and would routinely give answers to four or five significant figures. Thacher received a patent for this device in 1881.

Illustrations available:

Title page showing Thacher's instrument



T 21

Theodosius of Bithynia (2nd century, B.C.) [Christoph Clavius (1538–1612)]

Theodosii Tripolitae Sphaericorum Libri III. A Christophoro Clavio Bambergensi Societatis Jesu perspicuis demonstrationibus, ac scholij illustrati. Item eiusdem Christophori Clavii sinus, lineae tangentes, et secantes, triangula rectilinea, atque sphaerica.

Year: 1585 Place: Rome

Publisher: Dominici Basae

Edition: 1st Language: Latin

Binding: rebound with original leather preserved

Pagination: pp. [viii], 514, [ii]

Collation: $\tau^4 A - 2F^4 2G^6 2H - 2R^4 2S^6 2T - 3M^4 3N^6 3O - 3R^4$

Size: 207x145 mm

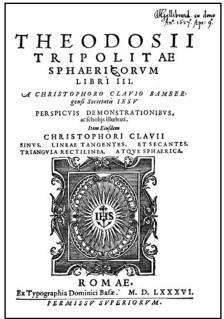
Theodosius has often been confused with another philosopher from Tripolis in Phoenicia, but recent scholarship (*DSB*) indicates that his birthplace was in Bithynia in the second half of the second century B.C. He was probably a younger contemporary of Hipparchus. He is known to have written several works, some now lost, but the most important was this *Sphaerics*.

Although the Greeks were leaders in the development of geometry, they considered the study of spherical geometry to be a branch of astronomy. Today, *Sphaerics* would be classified as a work on spherical trigonometry rather than astronomy. The *Sphaerics* was not lost because it was included in a compendium known as

The little astronomy (as compared with Ptolemy's The great astronomy, or Almagest). This compendium was translated into Arabic sometime in the ninth century A.D., and from there into Latin in the twelfth century by Plato of Trivoli and Gerard of Cremona. It was first printed in Venice in 1518. This version includes several additional items by **Christoph Clavius**, the editor, including a set of tables and two works on plane and spherical trigonometry.

This copy was owned by **Henry Gellibrand**, the famous English mathematician. An inscription on the title page reads *H Gellibrand ex dono Ano 1627 Apr: 9.* 1627 was the year that **Gellibrand** became the Gresham Professor of Astronomy. The book has been rebound with new endpapers with the original leather and label preserved.

Illustrations available: Title page Colophon



T 21



Colophon, T 21

Thoman, Fedor

Theory of compound interest and annuities with logarithmic tables.

Year: 1859 Place: London Publisher: John Weale Edition: 1st Language: English

Binding: deluxe contemporary leather; gold paneled, dentelle;

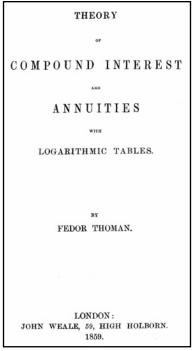
gilt edges

Pagination: pp. xvi, 128, [4], 64 Collation: $\pi^8B-F^{12}G^47^68-9^{12}M^4$

Size: 172x102 mm

This is a book of tables intended for the banking and financial industry. Thoman wrote a lengthy introduction (amounting to more than half of the volume) discussing the mathematics underlying the non-trivial financial calculations (e.g., deferred annuities, annuities with entrance fees, etc.). The work is dedicated to H. R. H. Prince de Joinville, most likely François Ferdinand Philippe Louis Marie d'Orléans, prince de Joinville, a well-known naval officer who was instrumental in the modernization of the French navy. An unknown editor has written the preface (in which Thoman is described as having connections with an unnamed large foreign financial company). This work may have been translated from a French original.

Illustrations available: Title page



T 23

[Thomas, Charles Xavier (de Colmar) (1785–1870)]

Instruction pour se servir de L'Arithmomètre, machine a calculer inventée par M. Thomas

Year: 1856 Place: Paris Publisher: Blondeau Edition: 2nd Language: French Figures: 1 folding plate

Binding: original printed paper wrappers - box

Pagination: pp. [2], 23, [1] Size: 236x155 mm

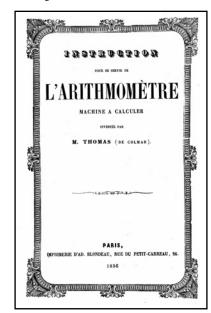
Charles Xavier Thomas de Colmar was the first to produce a production model calculating machine. In 1821, he submitted to the Société d'Encouragement pour L'Industrie Nationale, in Paris, a calculating machine he had constructed (see Thomas, Charles; Rapport ... sur la machine à calculer de M. le Chevalier Thomas, de Colmar, 1822; and Thomas, Charles; Description d'une machine à calculer nommée Arithmomètre, 1822). He is usually thought of as the founder of the calculating machine industry because earlier creators of such machines did so in limited quantities and cannot be said to have been in business. Thomas remained the only serious producer of calculating machines until Arthur Burkhardt began his firm in Germany in 1878. The Thomas factory produced about 1,500 machines between 1821 and 1878. Of this number, 60 percent were exported, about 30 percent were capable of using six decimal place numbers. 60 percent were eight decimal place and 10 percent were ten decimal places in the input mechanism (the result register would usually contain twice as many decimal places as the input mechanism). The interior workings



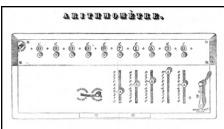
T 23

were based on the Leibniz stepped drum. The first few machines were driven by a ribbon wrapped around a drum that, when pulled, would rotate the mechanism one full revolution. This drive mechanism was replaced with a crank for the majority of the production.

Illustrations available:
Title page
Paper wrapper
Plate showing Arithmometre



Paper wrapper, T 23



Thomas Arithmometre, T 23

T 24 [Thomas, Charles Xavier (de Colmar) (1785–1870)]

Instruction pour se servir de L'Arithmomètre machine a calculer inventée par M. Thomas (de Colmar)

Year: 1873 Place: Paris

Publisher: Felix Malteste

Edition: 3rd Language: French

Figures: 1 folding plate of machine Binding: original printed paper wrappers

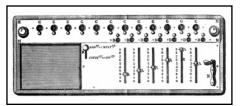
Pagination: pp. 28, [2] Size: 232x152 mm

This instruction booklet had changed very little from the original one published in 1852 (the collection contains

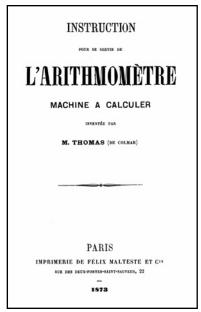
a facsimile copy of that volume). The only significant addition is a description of calculating cube roots. In all other cases, the examples remain the same. It contains only one diagram of the machine, a generic drawing that simply labels the controls, which also closely resembles the original machine—one extra digit capacity had been added to the input in the previous twenty years. This slight change gives some credence to the remark (see entry for **Reuleaux**, **Franz**; *Die sogenannte Thomas'sche rechenmaschine*, 1892) that the Thomas people failed to improve their product.

Illustrations available: Title page

Diagram



Thomas Arithmomètre, T 24



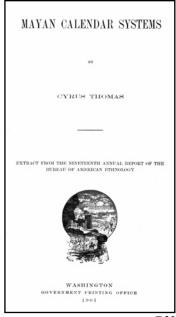
T 24

[Thomas, Charles Xavier (de Colmar) (1785–1870)] See Société D'Encouragement pour L'Industrie Nationale, Vingt-unième anée, No. CCXXI. Novembre 1822.

See Francoeur, Louis Benjamin; Rapport ... sur la machine à calculer de M. le Chevalier Thomas ...

See **Hoyau**, **L.A.D**.; Description d'une machine à calculer nommée Arithmomètre ...

See Warren, Thomas T.P. Bruce; On the application of the calculating machine of M. Thomas ...



T 25

Thomas, Cyrus (1825–1910)

Mayan calendar systems

Year: 1901

Place: Washington, DC Publisher: USGPO Edition: 1st Language: English Figures: 6 plates

Binding: later half-bound cloth, decorated paper boards

Pagination: pp. [2], 693–819 Size: 278x179 mm

This is an extract from the *Nineteenth Annual Report* of the Bureau of American Ethnology. The recent publication of high-quality photographs of the Mayan ruins at Copan, Quirigua, Tikal and Palenque prompted a renewed interest in the hieroglyphics found at these sites. This report details the latest findings concerning the calendar systems from that civilization. See also the entry for **Powell, John Wesley**; *Nineteenth Annual Report of the Bureau of American Ethnology*.

Illustrations available: Title page

T 26

Thomas, Cyrus (1825–1910)

Mayan calendar systems. II

b/w: Thomas, Cyrus; Mayan calendar ..., 1901.

Year: 1904

Place: Washington, DC

Publisher: USGPO Edition: 1st Language: English Figures: 12 plates

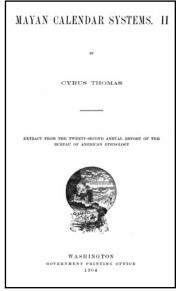
Binding: later half-bound cloth, decorated paper boards

Pagination: pp. [2], 197–320

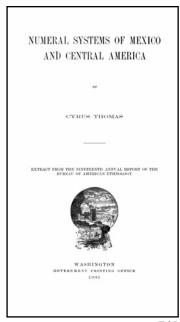
Size: 278x179 mm

This is an extract from the *Twenty-second Annual Report* of the Bureau of American Ethnology. See entry for **Thomas, Cyrus**; Mayan calendar systems, 1901, and other entries for Cyrus Thomas.

Illustrations available: Title page



T 26



T 27

Thomas, Cyrus (1825–1910)

Numeral systems of Mexico and Central America

Place: Washington, DC Publisher: USGPO Edition: 1st Language: English

Binding: later half-bound cloth, decorated paper boards

Pagination: pp. [2], 853-955 Size: 279x180 mm Reference: Cre CL, p. 115

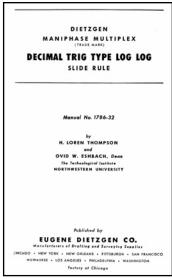
This is an extract from the Nineteenth Annual Report of the Bureau of American Ethnology. See the entry for John Wesley Powell, 1901, and other entries for Cyrus Thomas.

Illustrations available: Title page

Thomas, S. [pseudonym] (1723–1784) See Slack, Thomas; The banker's sure guide: or, monied man's assistant.., 1782 and 1798.

Thomas, Walker H. (1927–)

See Buchholz, Werner; Fundamentals of digital computer programming. In Proceedings of the I. R. E., Vol. 41, No. 10, October 1953.



T 28

Thompson, H. Loren and Ovid Wallace Eshbach

Dietzgen maniphase multiplex decimal trig type log log slide

Year: 1946 Place: Chicago

Publisher: Eugene Dietzgen

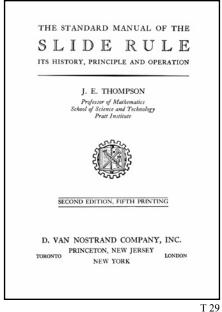
Edition: 1st Language: English

Binding: original paper wrappers Pagination: pp. [4], 106, [2] Size: 202x133 mm

The authors were from the Technical Institute of Northwestern University.

This is a standard manual on the use of the slide rule. It is distinguished only by the extensive tables of mathematical formulae and conversion factors found at

Illustrations available: Title page



T 29

Thompson, James Edgar (1892–)

The standard manual of the slide rule. Its history, principle and operation

> Year: 1952 Place: New York

Publisher: D. Van Nostrand

Edition: 2nd Language: English

Binding: original cloth boards; with dust jacket

Pagination: pp. viii, 216 Size: 210x136 mm

Thompson was a professor of mathematics at the Pratt Institute in Brooklyn.

This is a standard manual on the use of the slide rule. It is distinguished from the many similar works by the

Erwin Tomash Library

chapter on the history of the slide rule. It contains several hundred exercises for the student and has correct answers in an appendix.

Illustrations available: Title page

T 30

Thompson, James Edgar (1892–)

A manual of the slide rule; its history, principle and operation

Year: 1930 Place: London Publisher: Chapman & Hall Edition: 1st

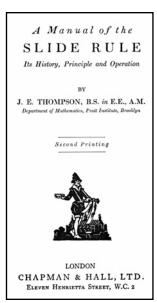
Language: English

Binding: original cloth boards; with dust jacket

Pagination: pp. vii, 220 Size: 186x121 mm

See entry for **Thompson**; *The standard manual of the slide rule*, 1952. That entry describes a later edition of this work.

Illustrations available: Title page



T 30

T 31

Thompson, James Edgar (1892–)

A manual of the slide rule. Its history, principle and operation

b/w: **Sloane**; Speed and fun with figures, 1939.

Year: 1930 Place: New York

Publisher: D. Van Nostrand

Edition: reprint Language: English

Binding: original cloth boards

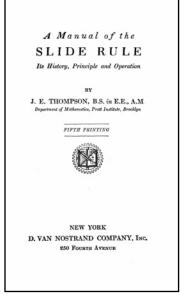
Pagination: pp. [2], viii, 184, viii, 220, iv, 155

Size: 187x124 mm

See entry for **Thompson**, **James Edgar**; *A manual of the slide rule*, 1930.

Illustrations available:

None



T 32

T 32

Thompson, James Edgar (1892–)

A manual of the slide rule. Its history, principle and operation

Year: 1942 Place: New York

Publisher: D. Van Nostrand

Edition: 5th Language: English

Binding: original cloth boards Pagination: pp. vii, 220 Size: 188x120 mm

See entry for **Thompson**, **James Edgar**; *A manual of the slide rule*, 1930.

Illustrations available: Title page

Т 33

Thompson, John Eric Sidney (1898–1975)

Maya Arithmetic

Year: 1941

Place: Washington, DC Publisher: Carnegie Institution Edition: 1st Language: English Figures: 4 figures

Binding: original paper wrappers

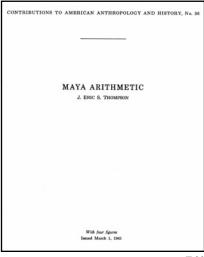
Pagination: pp. 38–62 Size: 277x228 mm

This is a reprint from the Carnegie Institution of Washington, Publication 528, pages 37–62. Thompson takes a quotation from the Spaniard Diego de Landa (they count on the ground or something level) to imply that the Maya used a form of the table abacus. He proposes how such an abacus might have operated under the assumption that the Maya used only addition and subtraction. He provides illustrations of his ideas using examples from the Dresden Codex. See also the entry for Long, Richard Charles Edward; 1948.

Illustrations available:

Title page

Example of Thompson's abacus method



T 33

T 34

Thomson, John (ca.1733–1807)

Tables of interest, at 3, 4, 4½, and 5 per cent. from one pound to ten thousand, and from one to three hundred and sixty-five days, in a regular progression of single days, with tables, at all the above rates, from one to twelve months, and from one to ten years. Also, tables shewing the exchange on bills, or commission on goods &c ...

Year: 1833 Place: London

Publisher: James Duncan

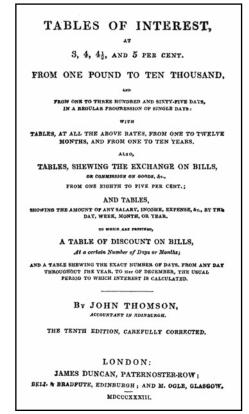
Edition: 10th Language: English

Binding: modern half leather marbled boards

Pagination: pp. viii, 532 Collation: $a^4B-Z^{12}2A^2$ Size: 175x100 mm See the entries for other similar tables by **John Thomson**. By the time this tenth edition appeared, Thomson was listed as an *Accountant in Edinburgh* rather than his original designation as *Accomptant in Edinburgh*.

Illustrations available:

Title page



T 34

T 35

Thomson, John (ca.1733–1807)

Tables of interest, at 4, $4\frac{1}{2}$, and 5 per cent. From 1 to 365 days, from 1 to 12 months, and from 1 to 10 years. Also, tables of exchange and commission, from $\frac{1}{8}$ to 3 per cent.

Year: 1768 Place: London

Publisher: Printed by Sands, Murray and Cochran. Sold by A.
Kincaid & J. Bell, Edinburgh; and by R. Baldwin and T.
Cadell, London

Edition: 1st Language: English

Binding: contemporary leather rebacked; red leather label

Pagination: pp. viii, 400 Collation: $\pi^4A-2K^6L^2$ Size: 160x95 mm

See the entries for other tables by **John Thomson**.

Illustrations available:

Title page

T A B L E S

O F

INTEREST,

At 4, 41, and 5 per Cent.

From 1 to 365 Days, from 1 to 12 Months, and from 1 to 10 Years.

ALSO.

Tables of Exchange and Commission,

From $\frac{1}{8}$ to 3 per Cent.

By JOHN THOMSON, Edinburgh.

EDINBURGH:

Printed by SANDS, MURRAY, and COCHRAN.

Sold by A. Kincaid & J. Bell, Edinburgh;
and by R. Baldwin, and T. Cadell, London.

MDCCLXVIII.

T 35

T 36

Thomson, John (ca.1733–1807)

Tables of interest, at 4, 4½, and 5 per cent. From 1 to 365 days, from 1 to 12 months, and from 1 to 10 years. Which, by directions given, answer for all other rates from 1 to 10 percent. Also, tables shewing the exchange on bills, or commission on goods from ⅓ to 3 per cent. To which is prefixed, a table, shewing the exchange allowed by the purchaser of a bill payable at a certain number of days or months.

b/w: **Thomson, John**; *Tables of interest, at three per cent. From 1 to 365 days, in a regular progression of single days. An advantage not to be found in any of the kind, excepting those of this author. Also tables, at the above rate, from 1 to 12 months, and from 1 to 10 years.*

Year: 1776 Place: Edinburgh

Publisher: T. Cadell and J. Murray, London, and William

Creech, Edinburgh

Edition: 2nd Language: English

Binding: contemporary leather rebacked; red leather label

Pagination: pp. [iv], 400 Collation: $\pi^2A-2K^6L^2$ Size: 164x95 mm

This is a standard set of commercial tables. They were very popular and went through numerous editions. The work is signed by Thomson on the verso of the title page as a mark of its authenticity. Two preliminary leaves from this second work are misbound after the title of first work.

Illustrations available: Title page

TABLES

OF

INTEREST,

At Three per Cent.

From 1 to 365 days, in a regular progression of single days:

An advantage not to be found in any of the kind, excepting those of this Author.

Alfo, Tables, at the above rate, from 1 to 12 months, and from 1 to 10 years.

By JOHN THOMSON, Accomptant in Edinburgh.

E D I N B U R G H:
Printed for T. Cadell, and J. Murray, London,
and William. Creech, Edinburgh.
MD ČCLXXVI.

T 36

TABLES

O F

INTEREST,

At 4, 41, and 5 per Cent.

From 1 to 365 Days, from 1 to 12 Months, and from 1 to 10 Years.

Which, by directions given, answer for all other rates from 1 to 10 per Cent.

A L S O,

Tables, shewing the Exchange on Bills, or Commission on Goods, from 1 to 3 per Cent.

To which is prefixed,

A Table, shewing the Exchange allowed by the purchaser of a bill payable at a certain number of days or months.

The SECOND EDITION, with Additions.

By JOHN THOMSON, Accomptant, Edinburgh.

EDINBURGH:
Printed for WILLIAM CREECH.
MDCCLXXV.

T 36

Thomson, John (ca.1733–1807)

The universal calculator; or the merchant's, tradesman's, and family's assistant. Being an entire, new, and complete set of tables, adapted for dealers in every branch of trade, by wholesale or retail, and all families.

Year: 1784 Place: Edinburgh

Publisher: W. Creech and C. Elliot and C. Dilly

Edition: 1st Language: English

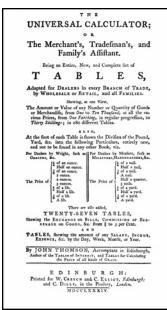
Binding: contemporary leather; red leather label

Pagination: pp. [8], 294 Collation: π^4 A–2N⁴2O³ Size: 206x111 mm

Thomson was obviously making a career out of creating and publishing these commercial tables. Like his other early editions, this one contains his signature as a sign of authenticity.

Illustrations available:

Title page



T 37

T 38

Thorndike, Lynn (1882–1965)

The Sphere of Sacrobosco and its commentators

Year: 1949 Place: Chicago

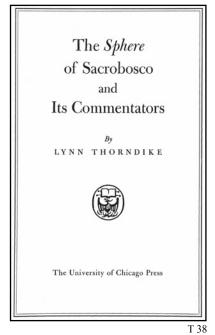
Publisher: University of Chicago Press

Edition: 1st Language: English

Binding: original cloth boards; with dust jacket

Pagination: pp. x, 496 Size: 228x146 mm Lynn Thorndike was a professor of history at Columbia University. He is well known for his works on the history of science and magic. In this volume he gives both the Latin and English texts for *de Sphera* and also comments on the *Algorismus* and *Computus* attributed to **Sacrobosco**.

Illustrations available: Title page



T 39 **Thoyer, Jules**

Les calculs d'intérêts réduit a l'addition ... méthode approvée par l'Académie des Sciences sur le rapport de M. A. Cauchy, adoptée par la Banque de France.

Year: 1841 Place: Paris

Publisher: Bachelier & Renard

Edition: 1st Language: French

Figures: 3 folding plates (1 engraved & 2 printed);

1 engraved plate laid in Binding: original paper wrappers Pagination: pp. 10, [2], 11–48

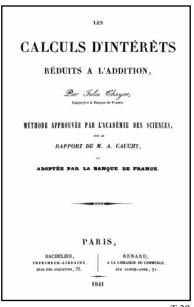
Collation: 1⁹ 2–3⁸ Size: 224x143 mm

Thoyer was an employee at the Bank of France.

This book describes a method of calculating interest by extracting factors from the numbers, multiplying these, and adding the resultant products to give the final answer. While it would have been useful in the bank where such calculations were common, this method was not of much use in performing occasional arithmetic operations. Indeed, it would likely take more time to do a multiplication via this method (when used only occasionally) than it would to simply work it out via the standard methods. A special form has been laid in to help implement the method, but in the days prior to easy access to facsimile machines, it simply would have been unrealistic for individuals to keep a quantity of these forms available. This problem did not, of course, apply to the Bank of France, which could have had the forms printed by the thousands. The method had been examined by the famous mathematician Augustin-Lois Cauchy, whose report on it to the French Academy is included on pages 44–48.

The author's name is inscribed on the title page and appears to read *Choyer*, but it is clearly printed as *Thoyer* in Cauchy's report.

Illustrations available: Title page



Thureau-dangin, Francois (1872-1944)

Sketch of a history of the sexagesimal system. From Osiris, Volume 7.

Year: 1939 Place: Bruges

Publisher: Santæ Catharinæ

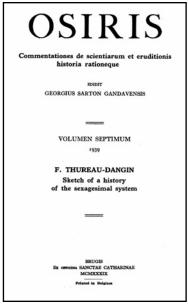
Edition: Offprint Language: English

Binding: printed paper wrappers

Pagination: pp. 95–141 Size: 254x180 mm

This paper begins with a number of quotations from ancient writers attempting to explain the origin of the sexagesimal (base 60) number system. The author shows that explanations had been offered in the past but that they were unsatisfactory. Thureau then outlines the known history of the system, starting with its first appearance among the Sumerians. Although he does illuminate some of the history, he does not manage to provide an explanation of how or why this system arose.

Illustrations available: Title page



Journal cover, T 40

T 41

Timbs, John (1801–1875)

Stories of inventors and discoverers in science and the useful arts. A book for young and old.

Year: 1860 Place: New York Publisher: Harper Edition: 1st Language: English

Figures: 2 pp. frontispiece of Babbage's Difference engine,

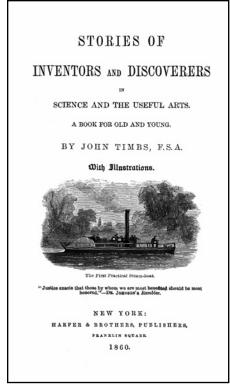
also pp. 139-144

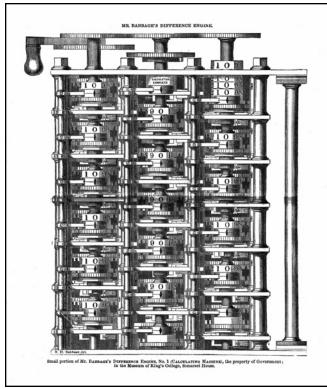
Binding: contemporary cloth boards; spine gilt, faded

Pagination: pp. xiv, 15–473, [3]

Collation: A-T¹²U¹⁰ Size: 183x105 mm

This volume surveys inventions from the time of the Greeks to the middle of the Victorian era. It is typical of the Victorian books that were initially designed to inspire children and young adults to lead more productive lives. An eight-page history of calculating machines is included—mainly devoted to an elementary description of the **Babbage** and **Scheutz** difference engines. The folding frontispiece is an engraving of that portion of





Babbage's Difference engine, 1833 model, T 41

Babbage's difference engine put together in 1833, now in the Science Museum, London.

Illustrations available:

Title page Frontispiece

T 42 **Tinter, Wilhelm Robert** (1839–1912)

Ein Betrag zur Kenntniss der leistungsfähigkeit der in der Praxis hauptsachlich verwendeten Planimeter. In Zeitschrift des osterr. Ingenieur & Architeckten Vereins, VIII & IX Heft, 1877.

Year: 1877 Place: Vienna Publisher: Author Edition: offprint Language: German

Figures: signatures 4–8 are double size Binding: original paper wrappers; uncut

Pagination: pp. 71, [1] Collation: 1–2⁸ 3² 4–7⁴ 8² Size: 239x146 mm

This paper is a description of an application for the planimeter. Extensive tables give the results complete with error bounds, etc.

Illustrations available: Title page



T 42

T 43 **Tissandier, Gaston** (1843–1899)

Les récréations scientifiques ou l'enseignment par les jeux

> Year: 1884 Place: Paris Publisher: G. Masson Edition: 4th

Language: French

Figures: 4 engraved colored plates; 218 figures in text

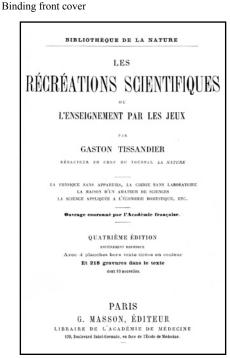
Binding: original leather; gold-stamped spine and front cover;

gilt edges

Pagination: pp. xii, 321, [3] Collation: $\pi^61-20^821^2$ Size: 236x140 mm

This nicely bound book, once given as a prize for excellence at the Ecoles Communales de Paris, contains a number of interesting explanations for *parlor trick* science. Of particular interest is the section in chapter IV on the analysis of chance and mathematical games.

Illustrations available: Title page



T 43



Cover, T 43

T 44

Toaldo, Guiseppe (1719–1798)

Tavole trigonometriche edizione accuratissima, con una introduzzione che contiene un compendio di trigonometria piana e sferica applicata alla pratica, con molte altre tavole e rischiaramenti utili in queste materie.

Year: 1769

Place: Padua

Publisher: Stamperia del Seminario

Edition: 1st Language: Italian

Size: 243x176 mm

Figures: 3 folding engraved plates Binding: contemporary leather; spine gilt

Pagination: pp. [8], 88, 182, [2] Collation: $\pi^4A-L^4a-z^4$

Reference: Hend BTM, #82, p. 84

Guiseppe Toaldo was a prominent eighteenth-century professor of astronomy and physical geography at Padua. He published a well-regarded **Galileo** edition as well as a large number of texts (Riccardi lists thirty-five) on scientific subjects connected with barometers and related meteorological topics, e.g., how the moon influences the weather.

The majority of this volume is taken up with tables of logarithms of numbers and of trigonometric functions. The tables follow a description of the use of logarithms and a discussion of plane and spherical trigonometry. This work appeared in three later editions: 1778, 1794 and 1808.

Illustrations available: Title page



T 44

Tompkins, Charles Brown (1912-1971), editor See Engineering Research Associates; High-speed computing devices.

T 45

Torres y Quevedo, Leonardo (1852–1936)

Discursos leídos ante la Real Academia de cienias exactas, físicas y naturales en la receptíon pública del ... el dia 19 de Mayo de 1901

Year: 1901 Place: Madrid Publisher: L. Aguado Edition: 1st Language: Spanish

Binding: original printed paper wrappers

Pagination: pp. 54, [2] Size: 261x174 mm

Reference: DSB XIII, pp. 431-432

Torres, a wealthy Spanish engineer, is best known for his ingenious calculating and chess-playing machines. He was also a fine civil engineer who, among other projects, constructed the cable car line in Niagara Falls, Ontario, that opened in 1916. He intensely disliked writing and thus is best known through his patents, his surviving machines and the descriptions of his inventions by others. It is only by looking at these sources and at the occasional transcripts of talks he gave that we can trace the history of his calculating machine developments.

This speech, his inaugural lecture to the Royal Academy of Sciences, is concerned with the subject of mathematical machines. As might be expected on a formal occasion such as this, it is a general survey with little hard detail.

Illustrations available: Title page



T 45

T 46

Torres y Quevedo, Leonardo (1852–1936)

Ensayos sobre automática. Su definició. Extensión teórica de sus aplicaciones. In Revista de la Real Academia de Ciencias Exactas, Fisicas y Naturales de Madrid, Vol. XII, No. 7, January 1914.

Year: 1914 Place: Madrid

Publisher: Academia de Ciencias Exactas, Fisicas y Naturales

de Madrid Edition: 1st Language: Spanish

Figures: 1 large folding plate, printed in red and black

Binding: original paper wrappers Pagination: pp. 391-419 Size: 241x167 mm

In this paper Torres shows that electromechanical devices can control very complex processes. He describes an electromechanical device controlled by a revolving drum; the drum acts as a control system, with the presence or absence of a contact on the drum controlling the action of the machine.

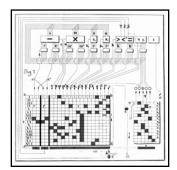
Illustrations available:

Title page

Diagrams 1 (color) Diagrams 2 (color)



Journal cover, T 46



Torres' control system, T 46

Torres y Quevedo, Leonardo (1852–1936)

Machines à calculer. In Mémoires présentés par divers savants à l'Académie des Sciences de l'Institut National de France Tome XXXII -No. 9.

Year: 1902 Place: Paris

Publisher: Imprimerie National

Edition: Extract Language: French Figures: 5 plates

Binding: modern marbled boards

Pagination: pp. 20 Collation: 1–2⁴3² Size: 270x218 mm

Reference: Pal, 337171; DSB XIII, pp. 431-432

In this paper Torres describes several analog calculating devices ranging from simple adding machines that would produce the sum $\frac{1}{2}(x+y)$ to complex systems capable of producing values for the function $\log(10^x + 1)$.

Illustrations available:

Title page Adding machines Complex machines

MÉMOIRES

PRÉSENTÉS PAR DIVERS SAVANTS

À L'ACADÉMIE DES SCIENCES

DE L'INSTITUT NATIONAL DE FRANCE.

TOME XXXII. — N° 9.

MACHINES À CALCULER,

M. L. TORRES,

ÁNIRUR DES PONTS ET CHAUSSÉES EN ESPAGNE

I

OBJET DE CETTE ÉTUDE.

On exprime souvent, en mécanique, les liaisons qui existent entre les différents points d'un système en écrivant les équations de condition que ces liaisons établissent entre les valeurs simultanées des coordonnées de ces points. Les liaisons se trouvent ainsi parfaitement définies; elles permettent tout mouvement compatible avec les équations et empèchent tout mouvement qui soit incompatible avec celles-ci. Imaginons, pour fixer les idées, qu'on ait construit un système dans lequel le nombre de points liés soit n et le nombre d'équations, établies par les liaisons entre les valeurs simultanées de leurs 3n coordonnées, soit k. Nous pourrons faire varier arbitrairement 3n-k de ces coordonnées, car à chaque instant, aux 3n-k valeurs de ces variables, que nous avons prises comme

Say. étrang, t. XXXII. — N° 9.

T 47

[Torres y Quevedo, Leonardo]

See Vigernon, H; L'arithmomètre. In La Nature, #2148, 7 August, 1920. T 48

Toussaint De St. Marcel, R. P.

Usage d'un compas de proportion a quatre boits. Avec lequel on pourra réfoudre tous les probêmes énoncés dans l'usage du compas à quatre branches, d'une maniere plus facile, plus prompte, & avec une exactitude qui approche du calcul; puisqu'on fera les quatre regles de l'arithmétique, en nombres, en lignes & en fractions; qu'on extraira la racine quarée & cubique; qu'on aura l'exaltation des puissances; l'évaluation des monnoies, des mesures étrangeres, &c. &c ... Avec vi figures. Ouvrage utile à tous les artistes, géometres, dessinateurs & arithméticiens, &c. &c.

Year: 1783 Place: Paris

Publisher: Chez Lamy Edition: 1st Language: French

Figures: 6 engraved plates (4 folding)

Binding: modern red morocco by Marc Ollivier; gilt dentelle on covers; spine gilt; green morocco lettering piece

Pagination: pp. [4], 252, [4], 48 Collation: π^2 A–2I⁴ A–C⁸ Size: 205x125 mm

This volume describes a combination of the reduction compass (see entry for **DeNorry**, **Milles**; L'usage et

USAGE D'UN COMPAS DE PROPORTION

A QUATRE BOITES.

Avec lequel on pourra résoudre tous les Probèmes énoncés dans l'Usage du Compas à quatre Branches, d'une maniere plus facile, plus prompte, & avec une exactitude qui approche du Calcul; puisqu'on fera les quatre Regles de l'Arithmétique, en nombres, en lignes & en fractions; qu'on extraira la racine quarrée & cubique; qu'on aura l'exaltation des puissances; l'évalution des Monnoies, des Mesures étrangeres, &c. &c.

Par le R. P. Toussaint de St. MARCEL, AVEC VI FIGURES.

Ouvrage utile à tous les Artistes, Géometres, Dessinateurs & Arithméticiens, &c. &c.

Prix 3 liv. broché, & 4 liv. relié.

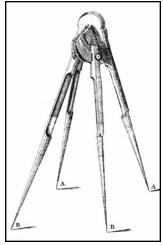


A PARIS.

Chez LAMY, Libraire, quai des Augustins.

M. DCC. LXXXIII.

Avec Approbation & Privilége du Roi.





Modified sector, T 48

Reduction compass, T 48

practique du compas a huict poinctes, 1588) and the sector. Toussaint attached four slides, similar to the cursors found on slide rules, each containing a sharp point, to the arms of the sector. With these he was able to take accurate measurements from drawings and then use the sector scales to accurately enlarge or reduce the diagram. The work begins with a description of a form of the reduction compass and continues with the modification of the sector. He provides tables for inscribing his scales onto the arms of a sector.

Illustrations available: Title page Sector with points Reduction compass Scales for his sector

T 49

Trenchant, Jean (1525-)

L'Arithmétique ..., departie en trois livres. Ensemble un petit discours des changes. Avec l'art de calculer aux getons. Reveüe & augmentée pour la quatrieme edition, de plusieurs regles & articles

Year: 1578
Place: Lyon
Publisher: Michel Jove et Jean Pillehotte
Edition: 6th
Language: French
Binding: contemporary vellum
Pagination: pp. 375, [1], 376–78, [1]
Collation: A–Z*2A*2B²
Size: 164x100 mm

Reference: H&J *AM*, T8.6, pp. 255–256; Smi *Rara*, p. 320; Pul *HA*, p. 116

Little is known about the life of Jean Trenchant other than that he was an arithmetic teacher working in Lyon in 1557. From the preface to the 1618 edition of this work, he appears to have been alive at that date.

Simon Stevin, in his *Tafeln van Interest*, Antwerp, 1582, states that interest tables were first published by Jean Trenchant in 1558 (a copy of which was added to this collection in 2006). There were at least sixteen editions of these tables in the next one hundred years.

Trenchant became quite well known because of the various editions of this book. The first edition was in 1563, and it continued in print until at least 1643.

The material in this text is quite standard: elementary arithmetic operations, the rule of three with applications, figurate numbers, roots, etc. In this edition an additional two chapters have been added on money exchange and the use of the table abacus.

Illustrations available:
Title page
Table abacus multiplication



T 49

Treutlein, Josef Peter (1845–)

Das Rechnen im 16. Jahrhundert. In Zeitschrift für Mathematik und Physik. Supplement zur historischliterarischen abtheilung des XXII Jahrgangs.

> Year: 1877 Place: Leipzig Publisher: B.G. Teubner

Edition: 1st Language: German

Figures: 1 engraved folding plate Binding: modern paper wrappers

Pagination: pp. [4],198, [2] (article: pp. 1-100)

Collation: $\pi^2 1 - 12^8 13^4$ Size: 227x151 mm

Nothing is known about the author other than that he was a teacher in Karlsruhe.

This is a history of arithmetic beginning with finger reckoning and the table abacus and finishing with a discussion of the rule of three and the rule of false position. In between, he describes the various methods of performing arithmetic operations (gelosia multiplication, galley division, etc.).

Illustrations available:

Title page



Trew, Abdias (1597–1669)

Manuale geometriæ practicæ: Geometrisches Handbüchlein Von Geometrischem Abriss, abtheilung verwandlung, vergrösserung und verjüngerung Geometrischer Figuren. Und wie solches In der Astronomia, Compass machen, Land und Feld messen, Baü und Büchsenmeisterey, Musica und Orgelmachen, mahlen und visieren. Ohne kostbarlichen apparat sonderbater Instrumenten nützlich zu gebrauchen.

> Year: 1636 Place: Nürnberg

Publisher: Wolfgang Endter

Edition: 1st Language: German

Figures: engraved frontispiece; 8 engraved folding plates

Binding: modern vellum-backed boards

Pagination: pp. [x], 86, [2] Collation: π²A-E⁸F Size: 150x86 mm

Abdias Trew (Treu) was first a rector in Ansbach and then, from 1636, a professor of mathematics and physics at the University of Altdorf (as successor to Daniel Schwenter—see Schwenter, Daniel; Geometriae parcticae nova).

This is a work on the problem of how to draw a map of the spherical world onto a plane piece of paper. The printer also had issued a number of Gaspar Schott's and Adriaan Vlacq's works.

Illustrations available:

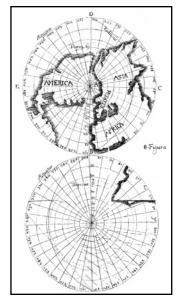
Title page Engraved frontispiece Polar maps



T 51



Frontispiece, T 51



Polar maps, T 51

T 52 **Trithemius, Johannes** (1462–1516)

Polygraphie, et universelle escriture cabalistique de M.I. Tritheime Abbé, traduicte par Gabriel de Collange, natif de Tours en Auvergne.

Year: 1561 Place: Paris

Publisher: Jacques Kerver

Edition: 1st Language: French

Figures: 13 red & black plates with volvelles; several tables in

red & black

Binding: contemporary leather; rebacked; gilt spine; red leather label; small gilt emblem of crowned dolphin on both

covers

Pagination: ff. [18], 300 (misnumbering 110 as 100; 188 as

186; 190 as 188; 289 as 286) Collation: $\grave{a}^{8}\grave{e}^{10}a-z^{8}A-G^{8}H^{4}I-P^{8}$

Size: 244x186 mm

Reference: Gal BLC, p. 184; Brunet MLAL, V 960

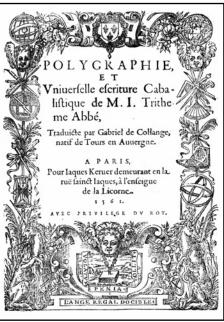
The author was simply known as *Johannes* until at the age of seventeen he entered the University of Heidelberg, where he adopted the surname of Trithemius after his birthplace, Trittenheim, near the city of Trier.

After he had completed his studies, he entered the ancient Benedictine abbey at Spanheim, where, soon after completing his novitiate period, he was elected abbot by his peers. His intellectual reputation became established after he published a very well-received book of sermons at the early age of twenty-four. Throughout his career he was a prolific author and preacher.

As was common in his day, Trithemius believed in the occult and saw in this belief no conflict with his Christian piety. Inevitably, this view caused difficulties for him with the authorities of the Catholic Church. These problems increased in 1499 when he authored a work titled *Steganographia* (from the Greek for *hidden writing*). The work circulated clandestinely in manuscript form for over one hundred years before being printed in 1606. In short order (1609), the work was put on the Index of Prohibited Books (the 1609 date is from Kahn, David; *The codebreakers*, pp. 130–137, whereas others have erroneously given the date as 1509). The *Steganographia* covered a number of topics in addition to cryptography, including magic, alchemy, telepathy and Cabalistic computation. It was denounced as sorcery even before it had been completed, and it became a constant source of irritation to his fellow monks.

In 1508, Trithemius began to write *Polygraphiae*, a work entirely devoted to the subject of cryptography, perhaps (as Kahn, David; *The codebreakers*, p. 133 suggests) to convince the authorities that this had been his intention from the outset. As was customary, Trithemius wrote *Polygraphiae* in Latin. The first edition was published after the author's death by **Jacob Köbel**, Oppenheim, 1518.

This first French edition was published in Paris more than forty years later. It is an elegant work translated, edited and augmented by Gabriel de Collange (1524–1572). It is divided into three major sections, each with its own title page. Each title page has a full-page portrait woodcut of Gabriel de Collange on the verso. The text of the *Polygraphiae* itself (five books) follows



T 52

after a dedication to the king of France and introductory expository material by Collange. The first book consists mainly of columns of twenty-four words each—one for each letter of the alphabet (which then lacked the modern j, v and w) plus a word representing &. By selecting words from adjacent columns to spell out a message, the words could be used to produce the so-called Ave Maria code. When written down, the words appear as a simple prayer. The other four books contain similar coding schemes. The tables in Books 4 and 5 are beautifully printed in red and black. In Book 5 a polyalphabetic cryptographic system is described for the first time, with the square table used to do the encoding—details can be found by consulting Kahn, pp. 135.

The next section is the *Clavicule* or *Key* to the work written by Gabriel de Collange. Included in this portion is a brief essay on the work by Adolph Glauberg, together with his introduction to the *Steganographia*.

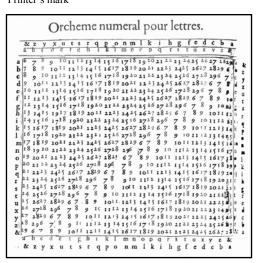
The final section is the *Tables et Figures Planispheriques* ... Written by Collange, this closing section contains the beautiful woodcut volvelles used to carry out the coding schemes.

The binding of this copy is noteworthy because as noted on a paste-in, it bears the crowned dauphin of the library of François II, the ill-fated king of France, on both the front and rear covers.

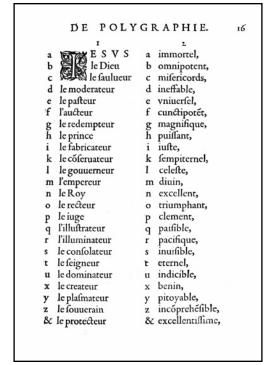
See also the entry for **Porta, Giovanni Battista**; *De furtivis literarum notis vulgo*, 1591.

Illustrations available:

Title page Ave Maria codes Polyalphabetic square (color) Volvelle (color) Eastern codes (color) Printer's mark



Polyalphabetic square, T 52



Ave Maria code, T 52



Eastern code, T 52

Troili, Giulio, translator

See Scheiner, Christoph; Pratica del parallelogrammo da disegnare, del P. Christoforo Scheiner della Compagnia di Giesù.

Troncet

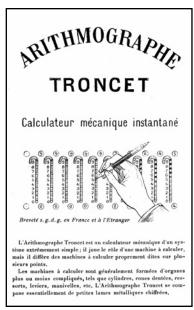
Arithmographe Troncet. Calculatuer mécanique instantané

Year: ca. 1900 Place: Paris

Publisher: A. Gautherin Edition: unknown Language: French Binding: unbound Pagination: pp. [4] Size: 177x118 mm

The Troncet is typical of the small, usually hand-held, stylus-driven adding machines. They are often known as *crook* or *cane* adders because of the shape of the input slots (see illustration). The user moved a stylus up or down the slot *n* spaces to add or subtract the digit *n*. If there was not enough space to move *n* places, the stylus was forced to go over the hook and effect a carry to the next digit.

Illustrations available: Title page



T 53

T 54

Tsien, H. S.

Engineering cybernetics

Year: 1954 Place: New York Publisher: McGraw-Hill Edition: 1st Language: English

Binding: original cloth boards; with dust jacket

Pagination: pp. xii, 289, [1] Size: 228x147 mm The author worked at the Jet Propulsion Center at the California Institute of Technology in Pasadena.

This is a highly technical work on control engineering and feedback mechanisms designed as a text for a senior course in the subject.

Illustrations available: Title page

ENGINEERING CYBERNETICS H. S. TSIEN Daniel and Florence Guggenheim Jet Propulsion Center California Institute of Technology Passalena, California McGRAW-HILL BOOK COMPANY, INC. New York Toronto London 1954

T 54

Т 55

Tukey, John Wilder (1915–2000)

See IBM - [International Business Machines

Company]; *Proceedings-computation seminar-December 1949 - Standard methods of analyzing data* (Tukey authored a paper in this volume).

T 56

Tumbleson, Robert C.

Calculating Machines. In Electrical Engineering, Vol. 67, #1 (Jan 1948).

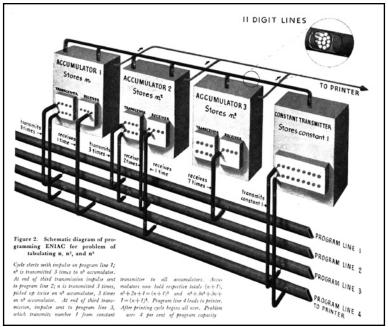
Year: 1948 Place: New York Publisher: AIEE Edition: 1st Language: English

Binding: original paper wrappers

Pagination: pp. 6–12 Size: 295x223 mm

Tumbleson was a staff member at the National Bureau of Standards.

This is a very brief description of the various computing machines available or planned in 1947. It originally



ENIAC "program" diagram, 56

appeared in *Federal Science Progress* six months prior to this publication. Its main point of interest is perhaps the very good diagram of a simple program for the ENIAC (tabulating n, n^2 and n^3).

Illustrations available: ENIAC diagram (color)

T 57

Tunstall, Cuthbert (1474–1559)

De arte supputandi libri quattuor.

Year: 1522 Place: London Publisher: Richard Pynson Edition: 1st Language: Latin

Binding: 18th-century leather, gilt; rebacked preserving old

spine and red leather label

Pagination: ff. 204

Collation: $A-S^4T^6V^6V^6X-Z^4a^4ab^6b-z^4\&^4$

Size: 227x156 mm

Reference: Smi *Rara*, pp. 132–153; Win *ESTC*, 24319; DeM *AB*, p. 13; Horb *CC*, #38, pp. 32–33

Cuthbert Tunstall began his studies in Oxford but soon moved to Cambridge because of the plague. He later studied Canon and Roman law at Padua. He held several appointments in Henry VIII's court and was made Bishop of London only a few days after this work was published.

This is the first complete work on arithmetic to be published in England. It was preceded only by a chapter in Caxton's *Myrrour of the World*, published in 1481.

Pynson, the printer, was Caxton's successor, and he obviously managed to maintain his master's quality of printing.

The work is a practical arithmetic with emphasis on commercial transactions. It has been said that Tunstall wrote it for the benefit of his friends to assist them with the calculations needed to avoid being taken advantage of by shifty money changers. In content and structure the work resembles that by **Luca Pacioli** and other Continental arithmetics, which Tunstall undoubtedly encountered in Padua or during his extensive travels for Henry VIII. An unusual feature in the book is the separate tables for addition and subtraction as well as those usually found for multiplication.

19	18	17	16	t5	14	13	12	11	30
9 10	18 9	17 8	16	15	14	13	9	9 2	9
1	8	5	8 8	15 8 7	14	13	12 8 4	8 3	8
		7	16	15 7 8	1477	13	7 5	7/4	7
		,	6	15	14	13 6 7	6	5	6
				5	14 5 9	13 5 8	13	5	5
					4	13 4 9	8	47	4
						3	12 3 9	3	3
							2.	9	
									W.

Subtraction table, T 57



T 5'

The work is perhaps a bit too scholarly and was not popular in England. It was, however, on the reading list for students at Oxford and was reprinted several times in Europe. **Robert Recorde**'s English language arithmetic appeared fifteen years later in 1537 and seems to have eclipsed Tunstall's work, at least in England.

The title page is a revised version of one by Hans Holbein, whose initials can be seen on the left border. The woodcut was first used by a printer in Basel in 1516. The work is appropriately dedicated to Thomas More, who was sub-treasurer of England at the time and was a particular friend of Tunstall.

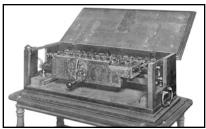
Illustrations available: Title page Addition table Subtraction table Colophon

IMPRESS. LONDINI IN AEDIBVS RIS
CHARDI PYNSONI. ANNO VERS
BI INCARNATI. M. D. XXII.
PRIDIE IDVS OCTOS
BRIS. CVM PRIS
VILEGIO A
REGE INS
DVLS
TO.

Colophon, T 57



T 58



Leibniz machine, T 58

T 58

Turck, Joseph A. V.

Origin of modern calculating machines. A chronicle of the evolution of the principles that form the generic make-up of the modern calculating machine.

Year: 1921 Place: Chicago

Publisher: Western Society of Engineers

Edition: 1st Language: English

Figures: photographic plate frontispiece

Binding: original blind-embossed dark green leather

Pagination: pp. 196 Size: 224x137 mm Reference: Bud *IOS*, p. 77

The proliferation of different types of calculating machine created an opportunity for someone to describe them and their origins. Turck does just that job for American machines. He does mention the European machines (Odhner, Brunsviga, etc.) in passing, but in this work Turck concentrates mainly on the Burroughs

and Comptometer machines. A main feature is the reproduction of patent drawings for a number of different machines.

Illustrations available:

Title page
Baldwin patent drawings
Parmelee patent drawings
Macaroni box Comptometer
Leibniz machine
Felt patent drawings
Comptometer

Т 59

Turing, Alan Mathison (1912–1954)

Computability and λ - definability. In Journal of Symbolic Logic, Vol. 2, No. 4, December 1937.

Year: 1937 Place: n/p

Publisher: Association for Symbolic Logic

Edition: 1st Language: English Binding: buckram Pagination: pp. 153–163 Size: 247x161 mm

Reference: DSB XIII, pp. 497-498

Alan Turing is best known to the general public for his cryptographic work during World War II. This phase of his career was celebrated on stage and in television and film by Hugh Whitemore's drama *Breaking the Code*. Turing was also a fine mathematician who made make major contributions to the newly developing field of computer science. He also contributed to the field of biology, particularly to botany.

Turing was an unconventional person who was an indifferent public school student prior to his admission to King's College, Cambridge, in 1931. He chose to

follow his own ideas and preferred his own somewhat idiosyncratic methods to those of his teachers. Turing found the Cambridge environment to be much more accommodating to his individuality and he blossomed as he developed his interest in mathematical philosophy and logic.

His design of the Pilot ACE (Automatic Computing Engine) at the National Physical Laboratory was ground breaking in that it used an entirely different architecture than that of other early computers. Full details of his life can be found in *Alan Turing: The enigma* by Andrew Hodges (Simon and Schuster, 1983).

In this paper, Turing provides a proof that his own concept of computability and Alonzo Church's λ -Calculus are equivalent. Both of these concepts had been developed independently and almost contemporaneously and had been used to arrive at the same fundamental mathematical result, i.e., that Hilbert's problem on the decidability of mathematical propositions is unsolvable.

Illustrations available: First page

T 60

Turing, Alan Mathison (1912–1954)

Computing machinery and intelligence. In Mind, Vol. LIX, No. 236, October 1950.

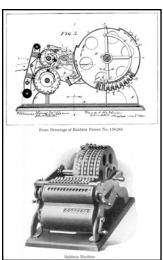
Year: 1950 Place: Edinburgh

Publisher: Thomas Nelson & Sons

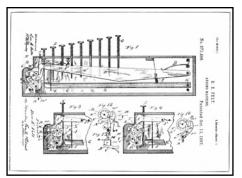
Edition: 1st Language: English

Binding: original printed paper wrappers

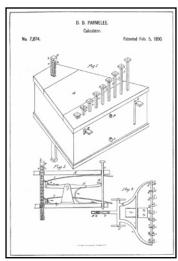
Pagination: pp. 433–460 Size: 213x136 mm



Baldwin patent, T 58



Felt patent, T 58



Parmelee patent, T 58

In this paper, Turing proposes the famous Turing Test, or Imitation Game, to decide the question *Can machines think?* The test is famous and, as of the early twenty-first century, has not been satisfactorily passed by a computer.

Illustrations available: First page

T 61

Turing, Alan Mathison (1912–1954)

On computable numbers, with an application to the entscheidungsproblem. In Proceedings of the London Mathematical Society, Series II, Vol. 42.

Year: 1937 Place: London

Publisher: London Mathematical Society, by C. F. Hodgson

& Son Edition: 1st Language: English Binding: buckram Pagination: pp. 230–265 Size: 247x158 mm

In this seminal paper Alan Turing introduced the concept of a universal problem-solving device that has become known as the *Turing machine*. The Turing machine is a theoretical abstraction. He showed that his hypothetical machine could replicate anything done by a human being following a set procedure or by any other mechanism or machine (including the yet-to-be-developed computer).

In 1900, David Hilbert, the great German mathematician, had posed twenty-three questions relating to the fundamentals of mathematics to the world. By 1928, he had reduced these to three major questions: Is mathematics complete? Is mathematics consistent? Is mathematics decidable? By 1930, when Turing was entering Cambridge, Kurt Gödel, a young Czech mathematician, had revolutionized mathematical thinking by answering the first two questions in the negative.

Turing conceived of his machine as a response to Hilbert's third question, for which the German shorthand nomenclature is the *Entscheidungsproblem* (*decision problem*). It required finding a process, or proving that none existed, to decide if any particular mathematical statement is true or not.

As so often happens, a few months earlier Alonzo Church in the United States had independently shown that there is no solution to the *Entscheidungsproblem*. Turing's similar result achieved through the simple concept of a rudimentary machine was to become more famous.

The Turing machine concept has led to proofs and solutions to a number of thorny theoretical questions in mathematics and computer science. In particular, it was used by Turing to show that there is no solution to what is usually termed the *halting problem* (see entry for **Turing, Alan**; *Solvable and unsolvable problems*).

Illustrations available: First page

T 62

Turing, Alan Mathison (1912–1954)

On computable numbers, with an application to the entscheidungsproblem. A correction. In Proceedings of the London Mathematical Society, Series II, Vol. 43.

Year: 1937
Place: London
Publisher: London Mathematical Society, by C. F. Hodgson & Son
Edition: 1st
Language: English
Binding: buckram
Pagination: pp. 544–546
Size: 247x158 mm

This short note contains a few corrections to Turing's earlier paper of the same title. The minor errors had been pointed out by Alonzo Church in his review of the original paper.

Illustrations available: Title page

Γ 63

Turing, Alan Mathison (1912–1954)

Solvable and unsolvable problems. In Science News, 31, February 1954.

Year: 1954 Place: London Publisher: Penguin Books Edition: 1st Language: English Binding: original paper wrappers Pagination: pp. 7–23 Size: 182x112 mm

Approximately a year before his death, Turing published this paper, which in effect summarizes his most theoretical work in computer science.

Specifically, Turing shows that the problem of whether some knot is the same as any other knot is in essence the *word problem for groups* first described by Russian topologist Sergei Petrovitch Novikov as unsolvable.

Turing also considers the halting problem of automata theory (essentially trying to find a process of testing a computer program to determine if it will ever produce an answer for certain inputs, then stop) and converts it into a problem of deciding whether a player can win a board game from any given initial position. Turing was a master of approaching very difficult problems by considering simpler, but mathematically identical, situations.

Illustrations available: Title page



Journal cover, T 63

T 64

Turing, Alan Mathison (1912–1954)

Some calculations of the Riemann zeta-function. In Proceedings of the London Mathematical Society, Series III, Vol.3, No. 9, March 1953.

Year: 1953 Place: Oxford

Publisher: Clarendon Press

Edition: 1st Language: English

Binding: original paper wrappers

Pagination: pp. 99–117 Size: 234x158 mm

Turing had used the computer at Manchester University to investigate a mathematical problem known as the *Riemann hypothesis*. In 1859, George Friedrich Bernhard Riemann (1826–1866) saw that the distribution of prime numbers was closely related to a complicated mathematical function known as the *Zeta function*. He conjectured that this function had zero value in specific circumstances and that a proof of this hypothesis would solve many extremely difficult problems in modern mathematics—Riemann's hypothesis remains unproven.

This paper reports on the theory behind his calculations and on the practical difficulties Turing encountered while using the Manchester computer.

Illustrations available: Title page T 65

Turing, Alan Mathison (1912–1954)

Systems of logic based on ordinals. In Proceedings of the London Mathematical Society, Series II, Vol. 45, Pt. 3, March, 21 1939.

Year: 1939 Place: London

Publisher: C. F. Hodgson & Son

Edition: 1st Language: English

Binding: original paper wrappers Pagination: pp. 161–228 Size: 260x175 mm

This is a mathematical paper written while Turing was visiting Princeton University and working with the logician Alonzo Church. War with Germany was imminent, and Turing was invited to become a staff member at Princeton. However, he elected to return to England, where he was almost immediately assigned to work with the Bletchley Park group of cryptographers attempting to break German Enigma codes.

Illustrations available: Title page

T 66

Turing, Alan Mathison (1912–1954)

The word problem in semi-groups with cancellation. In Annals of Mathematics, Second Series, Vol. 52, No. 2, September 1950.

Year: 1950 Place: Princeton

Publisher: Princeton University Press

Edition: 1st Language: English

Binding: original paper wrappers

Pagination: pp. 491–505

Size: 253x173 mm

Here Turing continues to exploit the Turing machine concept, which by now had become a powerful tool for solving certain theoretical problems. He proves that a previously difficult problem in group theory could be reduced to one that Emil Post (1897–1954), an American mathematician, had already shown to be unsolvable.

Illustrations available: Title page

Т 67

Turner, Richard (1724–1791)

Plain trigonometry rendered easy and familiar, by calculations in arithmetick only: with its application and use in ascertaining all kinds of heights, depths, and

distances, in the heavens. as well as on earth and seas; whether of towers, forts, trees, pyramids, columns, wells, ships, hills, clouds, thunder and lightening ... In which is also shewn, a curious trigonometrical method of discovering the places where bees hive in large woods, in order to obtain, more readily, the salutary produce of those little insects.

Year: 1765 Place: London

Publisher: S. Crowder and S. Gamidge

Edition: 1st Language: English

Binding: original paper boards Pagination: pp. [4], 40

Collation: A–L² Size: 290x172 mm

Turner was a divine, but he also wrote elementary books on science subjects. He was educated at Oxford and, on the title page, proudly proclaims himself as *late of Magdalen-Hall, Oxford* (now Hertford College).



1 0

This may be eafily done.—For in the Right Angled Triangle ABC, are given the Right Angle B, the Courfe of the first Bee, the Angle at A, the Courfe of the second Bee, and the Distance AB; to find BC, or AC, the Distance of the Tree from either Station.

∠ C : Base :: N. Rad. : Dist. AC
As 33-75 — 100 — 60.7 — 179.8 Perches.



Formerly, they found the *Honey* by furprizing the Bees, and following them, one after another, till they found out the Hive; but fince this *Trigonometrical Metbod* has been us'd, the Searchers discover that Booty in a few Hours, which before requir'd many Days.

Bee problem, T 67

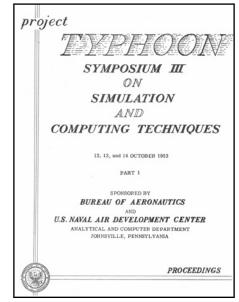
This is an elementary trigonometry book designed for *young mathematicians*. It begins with simple definitions and then includes a one-page listing of some of the properties of right-angled triangles and four pages giving the properties of general triangles. He follows this with a demonstration of the solution of twenty-four problems, none of them difficult. The last problem concerns how to find a beehive in the forest by capturing a few bees and noting their direction of flight when released—simple trigonometry would then provide the solution.

Illustrations available:
Title page (color)
Finding heights by using mirrors
Bee problem

Twysden, John, editor

See Foster, Samuel; Ellipticæ, or Azimuthal Horoliography. Comprehending several ways of describing dials upon all kindes of superficies

describing dials upon all kindes of superficies either plain or curved: and unto upright stiles in whatsoever position they shall be placed.



T 6

T 68

Typhoon [Project] - Department of the Navy, Bureau of Aeronautics - [United States]

Symposium III on simulation and computing techniques

Year: 1953

Place: Johnsville, PA

Publisher: Department of the Navy

Edition: 1st Language: English

Binding: boards over original paper wrappers

Pagination: pp. vi, 426 Size: 256x193mm Project Typhoon was one of several military-sponsored computer development projects that were a major influence on computer design in the early 1950s. All had names such as Whirlwind, Hurricane and Cyclone and were initially intended to be analog computers. Over time, a few of the projects switched their approach to digital. This volume contains the unclassified papers presented at the sessions of October 13 and 14, 1953. An additional volume, not present in this collection, was to be produced which contained the classified (confidential) papers that had been presented earlier in the symposium.

See also the entry for Aller, Jame C.; RAYDAC Computer

Illustrations available:

Title page

Paper cover

Table of contents 1

Table of contents 2

Table of contents 3

PROJECT TYPHOON

SYMPOSIUM III

ON

SIMULATION AND COMPUTING TECHNIQUES

12, 13, AND 14 OCTOBER 1953

University of Pennsylvania Museum Auditorium

Sponsored by

DEFARTMENT OF THE NAVY
EUREAU OF AERONAUTICS

and

U. S. NAVAL AIR DEVELOPMENT CENTER
Analytical and Computer Department
Johnsville, Pennsylvania

T 68

et pout univere; a tartant in ocontunt a tautrom vette. Bet que vitus in alter ductus pducit. Et il do nolecte velit que nue pducat. 8-in. 7 ductus. a limite in cuius lummitate ponit. 3-ociéédat quoulogin et consi tide liquité a limitro in dette portectis in cul? protejo ponit. 7- et refois tiat do numerus in veriules illos limitis coincidenta deleciptus eff. inue nietos. 96. qui lane numerus est ex. 8-in. 7-productus 6 8 7 ĺz ÍÓ 14 9 ĺz Ís 18 zj **27** Íz 14 20 24 z8 15 zo 25 45 18 48 42 21 **z**8 35 56 65 48 32 50 z4 40 64 36 54 27 Óξ 72

Multiplication table, T 69

T 69

Tzwivel, Theodoricus

Arithmetice opuscula duo Theodorici Tzwi vel de numero[rum] (que algorithimi dicunt[um]) unu[m] de integris per figuraru[m] (more alemamo[rum]) deletione[m]. Alteru[m] de proportionibus cuius usus frequens in musice[m] harmonica[m] Severini Boetij.

Year: 1507

Place: Cologne

Publisher: Heinrich Quentell Heirs

Edition: 2nd Language: Latin

Binding: modern half-bound leather marbled boards

Pagination: ff. [10] Collation: A⁶B⁴ Size: 191x131 mm

Reference: Smi Rara, p. 84–86; UCLA Microfilm, QA15, list

55, reel 8

Smith (*Rara*) indicates that Tzwivel was an arithmetician from the Westphalia district of Germany.

This arithmetic would have been very difficult to use as it is printed in very small type with no examples of the operations to aid the student. It describes the simple arithmetic operations (including mediation and duplation) and then progresses as far as a short discussion on roots and powers. The last two pages mention **Boethius** and describe a few of the medieval ratio operations.

Illustrations available:

Title page

Colophon

Multiplication table



T 6

Allgozithmi qui are dicitur numerandi wintegris per figurarum (maze Alemanozum) wletiones. The now provionity ingeniosi Pythagoziste I heodorici I swyuel. post plurima prapin iam tande in hoc opendius reducti sinis adest quod et puplica ob vti litatem in magistrali artis impressore takerna inger nuozum literozum Quentell iterato disteminari procuranti. Ainno a natali dominico I Dillesimo quin aentesimoseptimos

Colophon, T 69