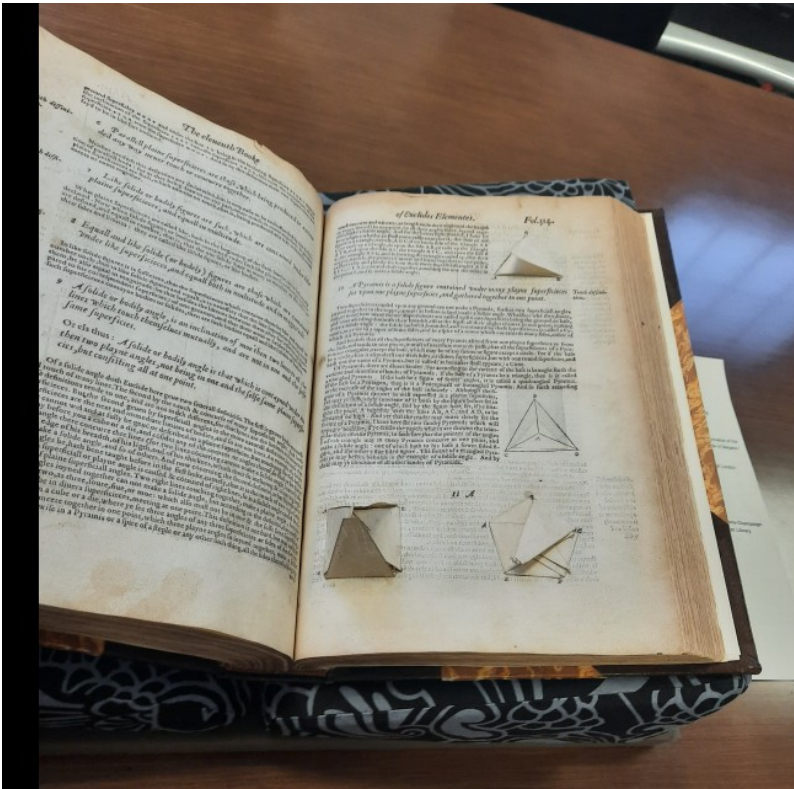


February 14, 2024

## Euclid's Book, The Elements of Geometry



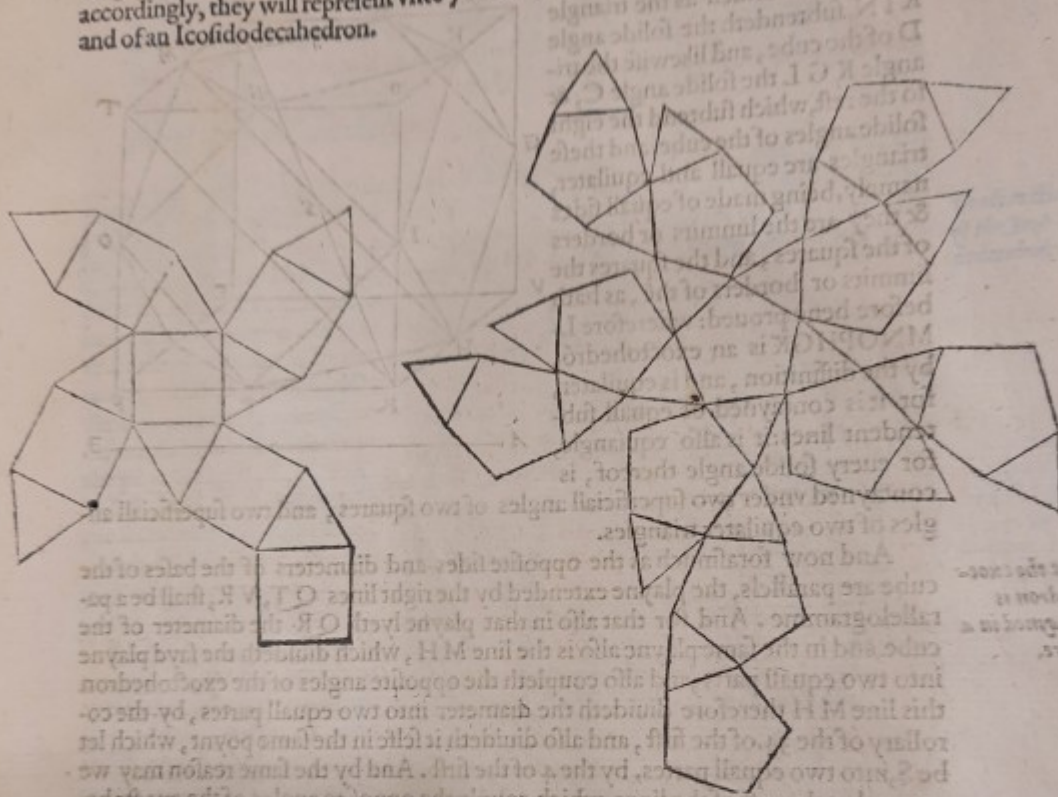
At the University of Illinois Rare Book Library with Chuck Lesnick, Ted Boone, and somebody else, and a curator, during a high school reunion. Mr. Lesnick set it up, and had them put out their James Bond collection for us, which they were happy to do.

This page has a pop-out 3-D diagram.



composed regular solides.

describē vpon pasted paper or such like matter, and then cut them and folde them accordingly, they will represent vnto you the perfect formes of an Exoctohedron and of an Icosidodecahedron.



The first Probleme.

To describe an equilateral and equiangle exoctohedron, and to contayne it in a sphere geuen: and to proue that the diameter of the sphere is double to the side of the sayd exoctohedron.

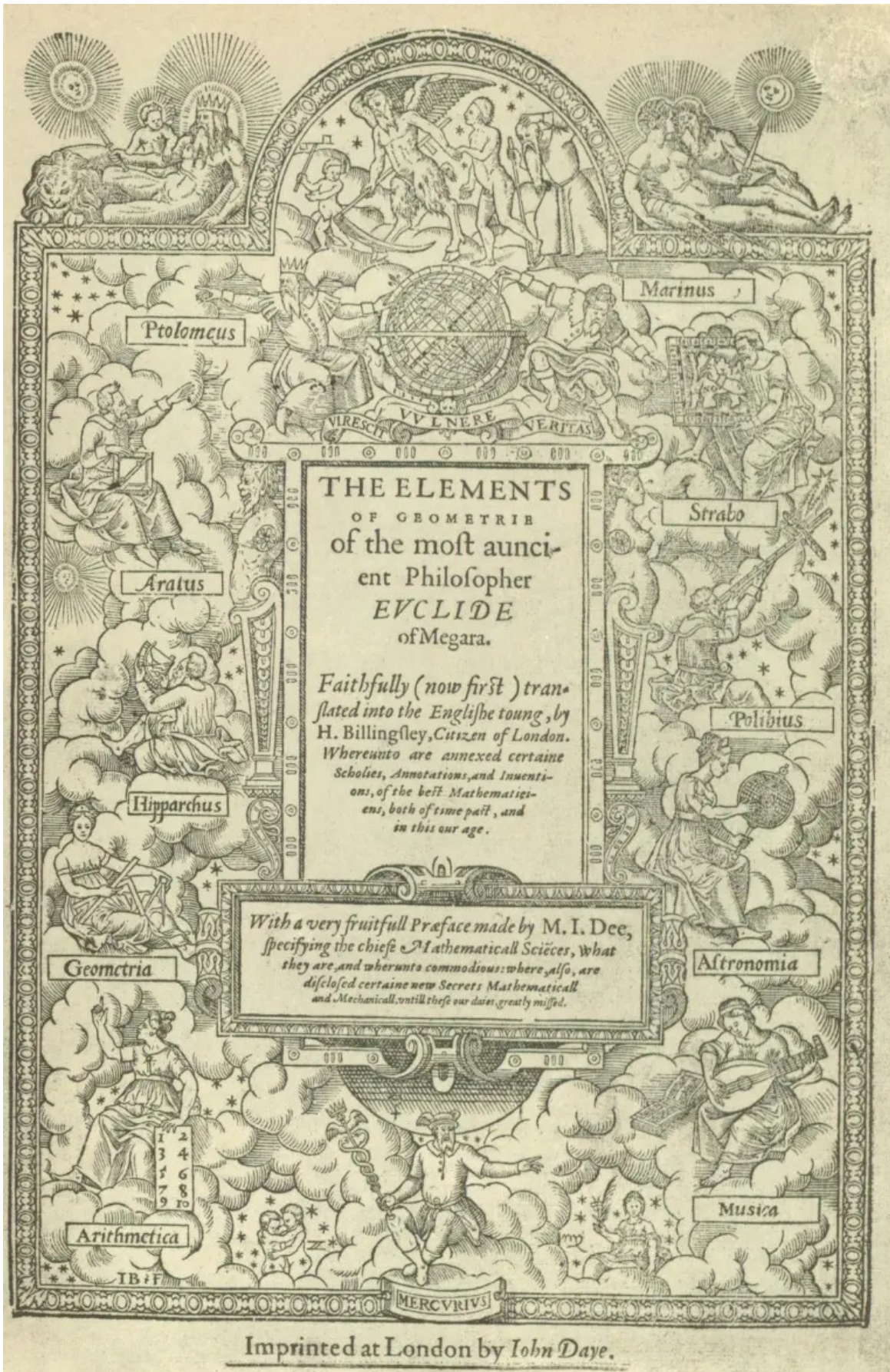


Vppose that there be a sphere geuen, whose diameter let be AB. And about the diameter AB let there be described a square by the sixth of the fourth: and vpon the square let there be described a cube by the 15. of the thirteenth: which let be CDEFQTVR: and let the diameter thereof be QR, and the centre S. And diuide the sides of the cube into two equall partes, in the poyntes G,H,I,K,L,M,N,O,P.&c. And couple the middle sections by the right lines IN,NO,OP,PI and such like, which subtend the angles of the squares or bases of the cube: and they are equall by the 4. first, and contalne right angles, as the angle NIP. For the angle NID which is at the base of the Iosceles triangle NDI, is the halfe of a right angle, and so likewise is the opposite angle RIP. Wherefore the residue NIP is a right angle, and so the rest. Wherefore NIP.O is a square. And by the same reason shall the rest NMLK,KGHI &c.inscribed

Construction of the exoctohedron.

DDD.ij. in

Book I is just plane figures. Later, Euclid talks about solids like spheres and cubes. Here's one that's folded out. Maybe I'll have you cut it out and fold it for homework. Justus is going to that just for fun.



Imprinted at London by Iohn Daye.

“The first English translation of Euclid's Elements to be printed was the one-hundredth piece of work of the famous English printer John Day, and was issued in 1570. The work is bound in two volumes in tooled sheep skin, with red titles lettered in gold, all in splendid state of preservation.”

“The First English Euclid,” Walter F. Shenton, *The American Mathematical Monthly*, Vol. 35, No. 10 (Dec., 1928), pp. 505-512 (8 pages)

<https://www.jstor.org/stable/2298163>

Note on the First English Euclid,” George Bruce Halsted, *American Journal of Mathematics*, Mar., 1879, Vol. 2, No. 1 (Mar., 1879), pp. 46-48.

<https://www.jstor.org/stable/2369195>

THE ELEMENTS  
of Geometry  
of the most ancient  
Philosopher  
EUCLID  
of Megara

Faithfully (now first) translated  
into the English tongue, by  
H. Billingsley, Citizen of London.  
With a very fruitful Preface made  
by M. I. Dee, specifying the chief  
Mathematical Sciences, what they are,  
and whereunto commodious: where also  
are disclosed certain new Secrets  
Mathematical and Mechanical, until  
these our days greatly missed.

Imprinted at London by *John Daye*.



Here is (gentle Reader) nothing  
 (the word of God onely set apart)  
 which so much beautifieth and a-  
 dorneth the soule and minde of  
 mā, as doth the knowledge of good  
 artes and sciences: as the know-  
 ledge of naturall and morall Phi-  
 losophie. The one setteth before  
 our eyes, the creatures of God,  
 both in the heauens aboue, and in the earth beneath: in which as  
 in a glasse, we beholde the exceding maiestie and wisdom of  
 God, in adorning and beautifying them as we see: in geuing vn-  
 to them such wonderfull and manifolde proprieties, and naturall  
 workinges, and that so diuersly and in such varietie: farther in  
 maintaining and conseruing them continually, whereby to praise  
 and adore him, as by S. Paule we are taught. The other tea-  
 cheth vs rules and preceptes of vertue, how, in common life a-  
 mongest men, we ought to walke vprightly: what dueties per-  
 taine to our selues, what pertaine to the gouernment or good or-  
 der both of an housholde, and also of a citie or common wealth.  
 The reading likewise of histories, conduceth not a litle, to the ad-  
 orning of the soule & minde of man, a studie of all men cōmen-  
 ded: by it are seene and knowen the artes and doinges of infinite  
 wise men gone before vs. In histories are contained infinite ex-  
 amples of heroicall vertues to be of vs followed, and horrible ex-  
 amples of vices to be of vs eschewed. Many other artes also  
 there are which beautifie the minde of man: but of all other none  
 do more garnishe & beautifie it, then those artes which are cal-  
 led Mathematicall. Unto the knowledge of which no man can  
 attaine, without the perfecte knowledge and instruction of the  
 principles, groundes, and Elementes of Geometrie. But per-  
 fectly

## THE TRANSLATOR TO THE READER

There is (gentle reader) nothing (the Word of God only set apart) which so much beautifieth and adorneth the soul and mind of man as doth the knowledge of good arts and sciences as the knowledge of natural and moral Philosophy. The one setteth before our eyes the creatures of God, both in the heavens above and in the earth beneath, in which as in a glass we behold the exceeding majesty and wisdom of God in adorning and beautifying them as we see, in giving unto them such wonderful and manifold proprieties and natural workings, and that so diversely and in such variety; farther in maintaining and conserving them continually, whereby to praise and adore him, as by S. Paul we are taught. The other teacheth us rules and precepts of virtue, how in common life amongst men we ought to walk uprightly, what duties pertain to ourselves, what pertain to the government or good order both of a household and also of a city or commonwealth. The reading likewise of histories conduceth not a little, to the adorning of the soul and mind of man, a study of all men commended; by it are seen and known the arts and doings of infinite wise men gone before us. In histories are contained infinite examples of heroical virtues to be of us followed, and horrible examples of vices to be of us eschewed. Many other arts also there are which beautify the mind of man, but of all other none do more garnish and beautify it than those arts which are called Mathematical, unto the knowledge of which no man can attain without the perfect knowledge and instruction in the principles, grounds, and Elements of Geometry. But perfectly to be instructed in them requireth diligent study and reading of old ancient authors. Amongst which none for a beginner is to be preferred before the most ancient Philosopher Euclid of Megara. For of all others he hath in a true method and just order gathered together whatsoever any before him had of these Elements written, inventing also and adding many things of his own whereby he hath in due form accomplished the art first giving definitions, principles, and grounds, whereof he deduceth his Propositions or conclusions in such wonderful wise that that which goeth before is of necessity required to the proof of that which followeth.

So that without the diligent study of Euclid's Elements it is impossible to attain unto the perfect knowledge of Geometry, and consequently of any of the other Mathematical sciences. Wherefore considering the want and lack of such good authors hitherto in our English tongue, lamenting also the negligence and lack of zeal to their country in those of our nation to whom God hath given both knowledge and also ability to translate into our tongue and to publish abroad such good authors and books (the chief instruments of all learnings), seeing moreover that many good wits both of gentlemen and of others of all degrees, much desirous and studious of these arts and seeking for them as much as they can, sparing no pains and yet frustrate of their intent, by no means attaining to that which they seek, I have for their sakes, with some charge and great travail, faithfully translated into our vulgar tongue and set abroad in Print this book of Euclid. Whereunto I have added easy and plain declarations and examples by figures of the definitions. In which book also ye shall in due place find manifold additions, Scholies, Annotations, and Inventions which I have gathered out of many of the most famous and chief Mathematicians both of old time and in our age, as by diligent reading it in course ye shall well perceive. The fruit and gain which I require for these my pains and travail shall be nothing else but only that thou, gentle reader, will gratefully accept the same, and that thou mayest thereby receive some profit, and moreover to excite and stir up others learned to do the like and to take pains in that behalf.

By meanes wherof, our Englishe tounge shall no lesse be enriched with good Authors, then are other straunge tounes: as the Dutch, French, Italian, and Spanish: in which are red all good authors in a maner, found amongst the Grekes or Latines. Which is the chiefest cause, that amongst thẽ do florise so many cunning and skilfull men, in the inuentions of straunge and wonderfull thinges, as in these our daies we see there do. Which fruite and gaine if I attaine vnto, it shall encourage me hereafter, in such like sort to translate, and set abroad some other good authors, both pertaining to religion (as partly I haue already done) and also pertaining to the Mathematicall Artes. Thus gentle reader farewell."

John Dee has a 48-page preface to *The Elements*, which is famous in itself. <https://www.gutenberg.org/files/22062/22062-h/22062-h.htm>

I have updated the spelling, as I did with the translator's preface earlier, to give you the first page or so of his article. I'll leave the spelling in the title unchanged though. "*Unum, bonum, and Ens*" means "The One, the Good, and Existence" in Latin.

## **"The Mathematicall Praeface to Elements of Geometrie of Euclid of Megara"**

TO THE UNFEIGNED LOVERS

of truth, and constant Students of Noble Sciences, JOHN DEE of London, heartily wisheth grace from heaven, and most prosperous Success in all their honest attempts and Exercises.

Divine Plato, the great Master of many worthy Philosophers and the constant avowcher and pithy persuader of *Unum, Bonum, and Ens*, in his School and Academy sundry times, besides his ordinary Scholars was visited of a certain kind of men allured by the noble fame of Plato and the great commendation of his profound and profitable doctrine. But when such Hearers after long harkening to him perceived that the drift of his discourses issued out to conclude this *Unum, Bonum, and Ens*, to be Spiritual, Infinite, Eternal, Omnipotent, & c., Nothing being alleged or expressed How worldly goods, how worldly dignity, how health, Strength or lustiness of body, nor yet the means how a marvelous, sensible, and bodily bliss and felicity hereafter might be attained, Straightaway the fantasies of those hearers, were damped, their opinion of Plato was clean changed; yea, his doctrine was by them despised and his school no more of them visited.



Which thing his Scholar, Aristotle, narrowly considering, found the cause thereof to be, For that they had no forewarning and information in general whereto his doctrine tended. For so might they have had occasion either to have forborne his school haunting (if they, then, had misliked his Scope and purpose) or constantly to have continued therein, to their full satisfaction if such his final scope & intent had been to their desire. Wherefore Aristotle ever after that used in brief to forewarn his own Scholars and hearers both of what matter and also to what end he took in hand to speak or teach. While I consider the diverse trades of these two excellent Philosophers and am most sure both that Plato right well otherwise could teach and that Aristotle might boldly with his hearers have dealt in like sort as Plato did, I am in no little pang of perplexity, because that which I dislike is most easy for me to perform and to have Plato for my example. And that which I know to be most commendable and in this first bringing, into common handling, the Arts Mathematical, to be most necessary is full of great difficulty and sundry dangers. Yet neither do I think it mete for so strange matter as now is meant to be published and to so strange an audience to be bluntly, at first, put forth, without a peculiar Preface; Nor (Imitating Aristotle) well can I hope that according to the amplex and dignity of the State Mathematical I am able either plainly to prescribe the material bounds or precisely to express the chief purposes and most wonderful applications thereof. And though I am sure that such as did shrink from Plato his school after they had perceived his final conclusion would in these things have been his most diligent hearers (so infinitely might their desires, in fine and at length, by our Arts Mathematical be satisfied) yet by this my Preface & forewarning, as well all such may (to their great behoofe) the sooner hither be allured, as also the Pythagorical and Platonical perfect scholar, and the constant profound Philosopher, with more ease and speed may (like the Bee,) gather hereby both wax and honey.

*Another part of Dee's article is fun to read. It is an example of "polemic": the writing of attacks. The 1500's was full of polemics. Martin Luther was famous for them. Famous scholars then did not hold back!*

*The problem was that some people thought John Dee was a magician because of all the tricks he could do with clever science and engineering. In those days, witches were sometimes burned at the stake, so this was a serious charge. Here's how Mr. Dee replied:*

### A DIGRESSION APOLOGETICAL

And for these and such like marvelous Acts and Feats, Naturally, Mathematically, and Mechanically wrought and contrived, ought any honest Student, and Modest Christian Philosopher be counted & called a CONJURER?

Shall the folly of Idiots and the Malice of the Scornful so much prevail that I, who seeketh no worldly gain or glory at their hands, but only of God the treasure of heavenly wisdom & knowledge of pure verity, shall he, I say, in the mean space, be robbed and spoiled of his honest name and fame? .... Will they provoke him by word and Print, likewise to note their Names to the World, with their particular devices, fables, beastly Imaginations, and unchristenlike slanders? Well, Well, Oh, you such my unkind Countrymen! Oh, unnatural Countrymen! Oh, unthankful Countrymen! Oh, Brainsick, Rash, Spiteful, and Disdainful Countrymen! Why oppress you me thus violently with your slandering of me, contrary to Verity and contrary to your own Consciences?