Book I of the Elements ΣΤΟΙΧΕΙΩΝ Α Öğelerin Birinci Kitabı

Euclid ΕΥΚΛΕΙΔΟΣ Öklid

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This edition of the first book of Euclid's *Elements* was prepared for a first-year undergraduate course in the mathematics department of Mimar Sinan Fine Arts University. The text has been corrected after its use in the course in the fall of 2011.

Öklid'in Öğeler'inin bu baskısı Mimar Sinan Güzel Sanatlar Üniversitesi, Matematik Bölümnde bir birinci sınıf lisans dersi için hazırlanmıştır. 2010–2011 Güz döneminde bu notlar ilk defa kullanılmış ve fark edilen hatalar düzeltilmiştir.

Introduction

Layout

Book I of Euclid's *Elements* is presented here in three parallel columns: the original Greek text in the middle column, an English translation to its left, and a Turkish translation to its right.

Euclid's *Elements* consist of 13 books, each divided into **propositions.** Some books also have **definitions,** and Book I has also **postulates** and **common notions.** In the presentation here, the Greek text of each sentence of each proposition is broken into units so that

1. each unit will fit on one line,
2. the unit as such has a role in the sentence,
3. the units, kept in the same order, make sense when translated into English.

Each proposition of the *Elements* is accompanied by a picture of points and lines, with most points (and some lines) labelled with letters. This picture is the **lettered diagram.** We place the diagram for each proposition *after* the words. According to Reviel Netz [12, p. 35, n. 55], this is where the diagram appeared in the original scroll, presumably so that one would know how far to unroll the scroll in order to read the proposition. The end of a proposition is not to be considered as an undignified position. Indeed, Netz judges the diagram to be a *metonym* for the proposition: something associated with the proposition that is used to stand for the proposition. (Today the *enunciation* of a proposition—see § below—would appear to be the common metonym.)

Text

We receive Euclid's text through various filters. The *Elements* are supposed to have been composed around 300 B.C.E. Heiberg's text (published in 1883) is based mainly on a manuscript in the Vatican written the tenth century C.E., closer to our time than to Euclid's time. Knorr [8] argues that Euclid's original intent may be better reflected in some Arabic translations from the eighth and ninth centuries. (The argument is summarized in [9].) Nonetheless, we shall just use the Heiberg text.

More precisely, for convenience, we take the Greek text in our underlying LaTeX file from the LaTeX files of Richard Fitzpatrick, who has published his own parallel English translation.[1] (In the underlying LaTeX file, the enunciation of Proposition I.1 in Greek reads as in Table 1.) Fitzpatrick reports that his Greek text is that of Heiberg, but he gives it without Heiberg's *apparatus criticus.* Also his method of transcription is unclear. There is at least one mistake in his text (τρὸς for πρὸς near the beginning of I.5). We shall correct such mistakes, if we find them, although we shall not look for them systematically.

In the process of translating, we have made use of a printout of the Greek text of Myungsunn Ryu.[2] We do not have a LaTeX file for this text; only `pdf`. The text is said to be taken from the *Perseus Digital Library.*

We also refer to images of Heiberg's original text [1], which are available as `pdf` files from the Wilbour Hall website[3] and from European Cultural Heritage Online (ECHO).[4] In preparing the files from the latter source for printing, we have trimmed the black borders by means of a program called `briss`.[5]

```
>Ep‘i t~hc doje’ishc e>uje’iac peperasm’enhc tr’igwnon >is’opleuron sust’hsasjai.
```

Table 1: Greek text, coded for LaTeX

Analysis

Each proposition of the *Elements* can be understood as being a **problem** or a **theorem.** Writing around 320 C.E., Pappus of Alexandria [17, pp. 564–567] describes the distinction:

> Those who favor a more technical terminology in geometrical research use

[1] `http://farside.ph.utexas.edu/euclid.html`
[2] `http://en.wikipedia.org/wiki/File:Euclid-Elements.pdf`
[3] `http://www.wilbourhall.org/`
[4] `http://echo.mpiwg-berlin.mpg.de/home/`
[5] `http://briss.sourceforge.net/`
[6] Ivor Thomas [17, p. 567] uses *inquiry* here in his translation; but there is *no* word in the Greek original corresponding to this or to *proposition.*

- **problem** (πρόβλημα) to mean a [proposition[6]] in which it is proposed to do or construct [something]; and
- **theorem** (θεώρημα), a [proposition] in which the consequences and necessary implications of certain hypotheses are investigated;

but among the ancients some described them all as problems, some as theorems.

In short, a problem proposes something to *do;* a theorem proposes something to *see.* (The Greek for *theorem* means more generally 'that which is looked at' and is related to the verb θεάομαι 'look at'; from this also comes θέατρον 'theater'.)

Be it a problem or a theorem, a proposition—or more precisely the *text* of a proposition—can be analyzed into as many as six parts. The Green Lion edition [3, p. xxiii] of Heath's translation of Euclid describes this analysis as found in Proclus's *Commentary on the First Book of Euclid's* Elements [14, p. 159]. In the fifth century C.E., Proclus[7] writes:

> Every problem and every theorem that is furnished with all its parts should contain the following elements:
>
> 1) an **enunciation** (πρότασις),
> 2) an **exposition** (ἔκθεσις),
> 3) a **specification** (διορισμός),
> 4) a **construction** (κατασκευή),
> 5) a **proof** (ἀπόδειξις), and
> 6) a **conclusion** (συμπέρασμα).
>
> Of these, the enunciation states what is given and what is being sought from it, for a perfect enunciation consists of both these parts. The exposition takes separately what is given and prepares it in advance for use in the investigation. The specification takes separately the thing that is sought and makes clear precisely what it is. The construction adds what is lacking in the given for finding what is sought. The proof draws the proposed inference by reasoning scientifically from the propositions that have been admitted. The conclusion reverts to the enunciation, confirming what has been proved.
>
> So many are the parts of a problem or a theorem. The most essential ones, and those which are always present, are enunciation, proof, and conclusion.

Alternative translations are:

- for ἔκθεσις, *setting out,* and
- for διορισμός, *definition of goal* [12, p. 10].

Heiberg's analysis of the text of the *Elements* into paragraphs does not correspond exactly to the analysis of Proclus; but Netz uses the analysis of Proclus in his *Shaping of Deduction in Greek Mathematics* [12], and we shall use it also, according to the following understanding:

1. The *enunciation* of a proposition is a general statement, without reference to the lettered diagram. The statement is about some subject, perhaps a straight line or a triangle.

2. In the *exposition,* that subject is identified in the diagram by means of letters; the existence of the subject is established by means of a third-person imperative verb.

3. (a) The *specification* of a *problem* says what will be done with the subject, and it begins with the words δεῖ δή. Here δεῖ is an impersonal verb with the meaning of 'it is necessary to' or 'it is required to' or simply 'one must'; while δή is a 'temporal particle' with the root meaning of 'at this or that point' [10]. That which is necessary is expressed by a clause with an infinitive verb. In translating, we may use the English form 'It is necessary for A to be B.'
(b) The specification of a *theorem* says what will be proved about the subject, and it begins with the words λέγω ὅτι 'I say that'. The same expression may also appear in a problem, in an additional specification at the head of the proof, after the construction.

4. In the *construction,* if it is present, the second word is often γάρ, a 'confirmatory adverb and causal conjunction' [16, ¶2803, p. 637]. We translate it as 'for', at the beginning of the sentence; but again, γάρ itself is the second word, because it is *postpositive:* it simply never appears at the beginning of a sentence.

5. Then the *proof* often begins with the particle ἐπεί 'because, since'. The ἐπεί (or other words) may be followed by οὖν, a 'confirmatory or inferential' postpositive particle [16, ¶2955, p. 664].

6. The *conclusion* repeats the enunciation, usually with the addition of the postpositive particle ἄρα 'therefore'. Then, after the repeated enunciation, the conclusion ends with one of the clauses:
(a) ὅπερ ἔδει ποιῆσαι 'just what it was necessary to do' (in problems); Heiberg translates this into Latin as *quod oportebat fieri,* although *quod erat faciendum* or QEF is also used;
(b) ὅπερ ἔδει δεῖξαι 'just what it was necessary to show' (in theorems): in Latin, *quod erat demonstrandum,* or QED.

Language

The Greek language that we have begun discussing is the language of Euclid: *ancient* Greek. This language belongs to the so-called Indo-European family of languages. English also belongs to this family, but Turkish does not. However, in some ways, Turkish is closer to Greek than English is. Modern scientific terminology, in English or Turkish, often has its origins in Greek.

0.0.1 Writing

[7] Proclus was born in Byzantium (that is, Constantinople, now İstanbul), but his parents were from Lycia (Likya), and he was educated first in Xanthus. He moved to Alexandria, then Athens, to study philosophy [14, p. xxxix].

capital	minuscule	transliteration	name
Α	α	a	alpha
Β	β	b	beta
Γ	γ	g	gamma
Δ	δ	d	delta
Ε	ε	e	epsilon
Ζ	ζ	z	zeta
Η	η	ê	eta
Θ	ϑ	th	theta
Ι	ι	i	iota
Κ	ϰ	k	kappa
Λ	λ	l	lambda
Μ	μ	m	mu
Ν	ν	n	nu
Ξ	ξ	x	xi
Ο	ο	o	omicron
Π	π	p	pi
Ρ	ρ	r	rho
Σ	σ, ς	s	sigma
Τ	τ	t	tau
ϒ	υ	y, u	upsilon
Φ	φ	ph	phi
Χ	χ	ch	chi
Ψ	ψ	ps	psi
Ω	ω	ô	omega

Table 2: The Greek alphabet

The Greek alphabet, in Table 2, is the source for the Latin alphabet (which is used by English and Turkish), and it is a source for much scientific symbolism. The vowels of the Greek alphabet are α, ε, η, ι, ο, υ, and ω, where η is a long ε, and ω is a long ο; the other vowels (α, ι, υ) can be long or short. Some vowels may be given tonal accents (ά, ᾶ, ὰ). An initial vowel takes either a rough-breathing mark (as in ἁ) or a smooth-breathing mark (ἀ): the former mark is transliterated by a preceding h, and the latter can be ignored, as in ὑπερβολή hyperbolê *hyperbola,* ὀρθογώνιον orthogônion *rectangle.* Likewise, ῥ is transliterated as rh, as in ῥόμβος rhombos *rhombus.* A long vowel may have an iota subscript (ᾳ, ῃ, ῳ), especially in case-endings of nouns. Of the two forms of minuscule sigma, the ς appears at the ends of words; elsewhere, σ appears, as in βάσις basis *base.*

In increasing strength, the Greek punctuation marks are [, · .], corresponding to our [, ; .]. (The Greek question-mark is like our semicolon, but it does not appear in Euclid.)

Euclid himself will have used only the capital letters; the minuscules were developed around the ninth century [16, ¶2, p. 8]. The accent marks were supposedly invented around 200 B.C.E., because the pronunciation of the accents was dying out [16, ¶161, p. 38].

Nouns

As in Turkish, so in Greek, a single noun or verb can appear in many different forms. The general analysis is the same: the noun or verb can be analyzed as STEM + ENDING (*gövde + ek*).[8]

Like a Turkish noun, a Greek noun changes to show distinctions of *case* and *number.* Unlike a Turkish noun, a Greek noun does not take a separate ending (such as *-ler*) for the plural number; rather, each case-ending has a singular form and a plural form. (There is also a dual form, but this is rarely seen, although the distinction between the dual and the plural number occurs for example in ἑκάτερος/ἕκαστος 'either/each'.)

Unlike a Turkish noun, a Greek noun has one of three *genders:* masculine, feminine, or neuter. We can use this notion to distinguish nouns that are *substantives* from nouns that are *adjectives.* A substantive always keeps the same gender, whereas an adjective *agrees* with its associated noun in case, number, and gender.[9] (Turkish does not show such agreement.)

The Greek cases, with their rough counterparts in Turkish, are as follows:

1. nominative (the dictionary form),
2. genitive (*-in hâli* or *-den hâli*),
3. dative (*-e hâli* or *-le hâli*[10] or *-de hâli*),
4. accusative (*-i hâli*),
5. vocative (usually the same as the nominative, and

[8] The stem may be further analyzable as ROOT + CHARACTERISTIC.

[9] English retains the notion of gender only in its personal pronouns: *he, she, it.* If masculine and feminine are together the *animate* genders, and neuter the inanimate, then the distinction between animate and inanimate is shown in *who/which.* Agreement of adjective with noun in English is seen in the demonstratives: *this word/these words.*

[10] One source, Özkırımlı [15, p. 155], does indeed treat *-le* as one of the *durum* or *hâl ekleri.*

anyway it is not needed in mathematics, so we shall ignore it below).

The accusative case is the case of the direct object of a verb. Turkish assigns the ending *-i* only to *definite* direct objects; otherwise, the nominative is used. However, for a neuter Greek noun, the accusative case is always the same as the nominative.[11]

A Greek noun is of the *vowel declension* or the *consonant declension,* depending on its stem. Within the vowel declension, there is a further distinction between the ᾱ- or *first* declension and the ο- or *second* declension. Then the consonant declension is the *third* declension. The spelling of the case of a noun depends on declension and gender. Turkish might be said to have four declensions; but the variations in the case-endings in Turkish are determined by the simple rules of vowel harmony, so that it may be more accurate to say that Turkish has only one declension. Some variations in the Greek endings are due to something like vowel harmony, but the rules are much more complicated. Some examples are in Table 3.

The meanings of the Greek cases are refined by means of *prepositions,* discussed below.

		1st feminine	1st feminine	2nd masculine	2nd neuter	3rd neuter
singular	nominative	γραμμή	γωνία	κύκλος	τρίγωνον	μέρος
	genitive	γραμμῆς	γωνίας	κύκλου	τριγώνου	μέρους
	dative	γραμμῇ	γωνίᾳ	κύκλῳ	τριγώνῳ	μέρει
	accusative	γραμμήν	γωνίαν	κύκλον	τρίγωνον	μέρος
plural	nominative	γραμμαί	γωνίαι	κύκλοι	τρίγωνα	μέρη
	genitive	γραμμῶν	γωνίων	κύκλων	τριγώνων	μερῶν
	dative	γραμμαῖς	γωνίαις	κύκλοις	τριγώνοις	μέρεσι
	accusative	γραμμάς	γωνίας	κύκλους	τρίγωνα	μέρη
		line	*angle*	*circle*	*triangle*	*part*

Table 3: Declension of Greek nouns

The definite article

	m.	f.	n.
nom.	ὁ	ἡ	τό
gen.	τοῦ	τῆς	τοῦ
dat.	τῷ	τῇ	τῷ
acc.	τόν	τήν	τό
nom.	οἱ	αἱ	τά
gen.	τῶν	τῶν	τῶν
dat.	τοῖς	ταῖς	τοῖς
acc.	τούς	τάς	τά

Table 4: The Greek article

Greek has a definite article, corresponding somewhat to the English *the.* Whereas *the* has only one form, the Greek article, like an adjective, shows distinctions of gender, number, and case, with forms as in Table 4.

Euclid may use (a case-form of) τό Α σημεῖον 'the A point' or ἡ ΑΒ εὐθεία [γραμμή] 'the AB straight [line]'. Here the letters A and AB come between the article and the noun, in what Smyth calls *attributive* position [16, ¶1154]. Then A itself is not a point, and AB is not a line; the point and the line are seen in a diagram, *labelled* with the indicated letters. However, Euclid may omit the noun, speaking of τό Α 'the A' or ἡ ΑΒ 'the AB'.

Sometimes (as in Proposition 3) a single letter may denote a straight line; but then the letter takes the feminine article, as in ἡ Γ 'the Γ', since γραμμή 'line' is feminine. Netz [12, 3.2.3, p.113] suggests that Euclid uses the neuter σεμεῖον rather than the feminine στιγμή for 'point' so that points and lines will have different genders. (See Proposition 43 for a related example.)

In general, an adjective may be given an article and used as a substantive. (Compare 'The best is the enemy of the good', attributed to Voltaire in the French form *Le mieux est l'ennemi du bien.*[12]) The adjective need not even have the article. Euclid usually (but not always) says *straight* instead of *straight line,* and *right* instead of *right angle.* In our translation, we use STRAIGHT and RIGHT when the substantives *straight line* and *right angle* are to be understood.

Euclid may also refer (as in Proposition 5) to κοινή ἡ ΒΓ 'the ΒΓ, which is common'. Here the adjective κοινή 'common' would appear to be in *predicate* position [16, ¶1168]. In this position, the adjective serves not to dis-

[11] English nouns retain a sort of genitive case, in the possessive forms: *man/man's/men/men's.* There are further case-distinctions in pronouns: *he/his/him, she/her, they/their/them.*

[12] `http://en.wikiquote.org/wiki/Voltaire`, accessed July 8, 2011.

tinguish the straight line in question from other straight lines, but to express its relation to other parts of the diagram (in this case, that it is the base of two different triangles).

Similarly, Euclid may use the adjective ὅλος *whole* in predicate position, as in Proposition 4: ὅλον τὸ ΑΒΓ τρίγωνον ἐπὶ ὅλον τὸ ΔΕΖ τρίγωνον ἐφαρμόσει 'the ΑΒΓ triangle, as a whole, to the ΔΕΖ triangle, as a whole, will apply'. Smyth's examples of adjective position include:
attributive: τὸ ὅλον στράτευμα *the whole army;*
predicate: ὅλον τὸ στράτευμα *the army as a whole.*
The distinction here may be that the whole army may have attributes of a person, as in 'The whole army is hungry'; but the army as a whole does not (as a whole, it is not a person). The distinction is subtle, and in the example from Euclid, Heath just gives the translation 'the whole triangle'.

In Proposition 5, Euclid refers to ἡ ὑπὸ ΑΒΓ γωνία, which perhaps stands for ἡ περιεχομένη ὑπὸ τῆς ΑΒΓ γραμμῆς γωνία 'the contained-by-the-ΑΒΓ-line angle' or ἡ περιεχομένη ὑπὸ τῶν ΑΒ, ΒΓ εὐθείων γραμμῶν γωνία 'the bounded-by-the-AB-ΒΓ-straight-lines angle'.[13] In the same proposition, the form γωνία ἡ ὑπὸ ΑΒΓ appears (actually γωνία ἡ ὑπὸ ΒΖΓ), with no obvious distinction in meaning. (Each position of [ἡ] ὑπὸ ΑΒΓ is called attributive by Smyth.) For short, Euclid may say just ἡ ὑπὸ ΑΒΓ for the angle, without using γωνία.

The nesting of adjectives between article and noun can be repeated. An extreme example is the phrase from the enunciation of Proposition 47 analyzed in Table 5.

τὸ ἀπὸ τῆς τὴν ὀρθὴν γωνίαν ὑποτεινούσης πλευρᾶς τετράγωνον
ἀπὸ τῆς τὴν ὀρθὴν γωνίαν ὑποτεινούσης πλευρᾶς
τὴν ὀρθὴν γωνίαν
the right angle
on the side subtending the right angle
the square on the side subtending the right angle

Table 5: Nesting of Greek adjective phrases

Prepositions

In the example in Table 5, the preposition ἀπό appears. This is used only before nouns in the genitive case. It usually has the sense of the English preposition *from,* as in the first postulate, or in the construction of Proposition 1, where straight lines are drawn *from* the point Γ to A and B. In Table 5 then, the sense of the Greek is not exactly that the square sits *on* the side, but that it arises *from* the side.

Euclid uses various prepositions, which, when used before nouns in various cases, have meanings roughly as in Table 6. Details follow.

When its object is in the accusative case, the preposition ἐπί has the sense of the English preposition *to,* as again in in the first postulate, or in the construction of Proposition 1, where straight lines are drawn from Γ *to* A and B.

The prepositional phrase ἐπὶ τὰ αὐτὰ μέρη 'to the same parts' is used several times, as for example in the fifth postulate and Proposition 7. The object of the preposition ἐπί is again in the accusative case, but is plural. It would appear that, as in English, so in Greek, 'parts' can have the sense of the singular 'region'. More precisely in this case, the meaning of 'parts' would appear to be 'side [of a straight line]'; and one might translate the phrase ἐπὶ τὰ αὐτὰ μέρη by 'on the same side' (as Heath does).[14] The more general sense of 'part' is used in the fifth common notion.

The object of the preposition ἐπί may also be in the genitive case. Then ἐπί has the sense of *on,* as yet again in the construction of Proposition 1, where a triangle is constructed *on* the straight line AB.

The preposition πρός is used in the set phrase πρὸς ὀρθὰς [γωνίας] *at right angles,* where the noun phrase ὀρθὴ [γωνία] *right [angle]* is a plural accusative. Also in the definitions of angle and circle, πρός is used with the accusative, in a sense normally expressed in English by 'to'. In every other case in Euclid's Book I, πρός is used with the dative case and also has the sense of *at* or *on* as for example in Proposition 2, where a straight line is to be placed *at* a given point.

There is a set phrase, used in Propositions 14, 23, 24, 31, 42, 45, and 46, in which πρός appears twice: πρὸς τῇ εὐθείᾳ καὶ τῷ πρὸς αὐτῇ σημείῳ '*at* the straight [line] and [*at*] the point *on* it'. (It is assumed here that the *first* occurrence of πρός takes two objects, both STRAIGHT and *point.* It is unlikely that *point* is ungoverned, since according to Smyth [16, ¶1534], in prose, 'the dative of place (chiefly *place where*) is used only of proper names'.)

The preposition διά is used with the accusative case to give *explanations.* The explanation might be a clause whose verb is an infinitive and whose subject is in the accusative case itself; then the whole clause is given the accusative case by being preceded by the neuter accusative article τό.[15] The first example is in Proposition 4: διὰ τὸ ἴσην εἶναι τὴν ΑΒ τῇ ΔΕ 'because AB is equal to ΔΕ'.

The preposition διά is also used with the genitive case,

[13] This is an elaboration of an observation by Netz [12, 3.2.1, p. 105; 4.2.1.1, pp. 133-4].

[14] According to Netz [12, 3.2.2, p. 112], 'parts' means 'direction' in this phrase, and only in this phrase.

[15] It may however be pointed out that the article τό could also be in the nominative case. However, prepositions are never followed by a case that is unambiguously nominative.

with the sense of *through* as in speaking of a straight line *through* a point. This use of διά always occurs in a set phrase as in the enunciation of Proposition 31, where the straight line through the point is also parallel to some other straight line.

The preposition κατά is used in Book I always with a name or a word for a *point* in the accusative case. This point may be where two straight lines meet, as in Proposition 27, or where a straight line is bisected, as in Proposition 10. The set phrase κατὰ κορυφήν 'at a head' occurs for example in the enunciation of Proposition 15 to describe angles that are 'vertically opposite' or simply *vertical.*

The preposition μετά, used with the genitive case, means *with.* It occurs in Book I only in Proposition 43, only with the names of triangles, only in the sentence τὸ ΑΕΚ τρίγωνον μετὰ τοῦ ΚΗΓ ἴσον ἐστὶ τῷ ΑΘΚ τριγώνῳ μετὰ τοῦ ΚΖΓ 'Triangle ΑΕΚ, with [triangle] ΚΗΓ, is equal to triangle ΑΘΚ with [triangle] ΚΖΓ'.

The preposition παρά is used in Book I only in Proposition 44, with the name of a straight line in the genitive case; and then the preposition has the sense of *along:* a parallelogram is to be constructed, one of whose sides is set *along* the original straight line so that they coincide.

The adjective παράλληλος 'parallel', used frequently starting with Proposition 27, seems to result from παρά + ἀλλήλων 'alongside one another'. Here ἀλλήλων is the reciprocal pronoun 'one another', never used in the singular or nominative; it seems to result from ἄλλος 'another'. The dative plural ἀλλήλοις occurs frequently, as in Proposition 1, where circles cut *one another,* and two straight lines are equal *to one another.*

The preposition ὑπό is used in naming angles by letters, as in ἡ ὑπὸ ΑΒΓ γωνία 'the angle ΑΒΓ'. Possibly such a phrase arises from a longer phrase, as in Proposition 4, ἡ γωνία ἡ ὑπὸ τῶν εὐθειῶν περιεχομένη 'the angle that is contained *by* the [two] sides [elsewhere indicated]'. Here ὑπό precedes the agent of a passive verb, and the noun for the agent is in the genitive case. There is a similar use in the enunciation of Proposition 9: ἡ ὑπὸ ΒΑΓ γωνία δίχα τέτμηται ὑπὸ τῆς ΑΖ εὐθείας 'The angle ΒΑΓ is bisected *by* the [straight line] ΑΖ'.

The preposition ὑπό is also used with nouns in the accusative case. It may then have the meaning of *under,* as in Proposition 5. More commonly it just precedes objects of the verb ὑποτείνω 'stretch under', used in English in the Latinate form *subtend.* The subject of this verb will be the side of a triangle, and the object will be the opposite angle.

The preposition ἐν 'in' is used only with the dative, frequently in the phrase ἐν ταῖς αὐταῖς παραλλήλοις 'in the same parallels', starting with Proposition 35. It is used in Proposition 42 and later with reference to parallelograms *in* a given angle. Finally, in Proposition 47 (the so-called Pythagorean Theorem), there is a general reference to a situation *in* right-angled triangles.

The preposition ἐξ 'from' is used with the genitive case. In Proposition 7, in the set phrase ἐξ αρχῆς 'from the beginning', that is, *original.* Beyond this, ἐξ appears only in the problematic definitions of straight line and plane surface, in the set phrase ἐξ ἰσοῦ: 'from equality' or, as Heath has it, 'evenly'.

The preposition περί 'about' is used only in Propositions 43 and 44, only with the accusative, only with reference to figures arranged *about* the diameter of a parallelogram.

Greek has a few other prepositions: σύν, ἀντί, πρό, ἀμφί, and ὑπέρ; but these are not used in Book I. Any of the prepositions may be used also as a *prefix* in a noun or verb.

Verbs

A *verb* may show distinctions of *person, number, voice, tense, mood (mode),* and *aspect.* Names for the forms that occur in Euclid are:

1. *mood:* indicative, imperative, or subjunctive;
2. *aspect:* continuous, perfect, or aorist;
3. *number:* singular or plural;
4. *voice:* active or passive;
5. *person:* first or third;
6. *tense:* past, present, or future.

(In other Greek writing there are also a *second* person, a *dual* number, and an *optative* mood. One speaks of a *middle* voice, but this usually has the same form as the passive.) Euclid also uses *verbal nouns,* namely *infinitives* (verbal substantives) and *participles* (verbal adjectives).

Suppose the utterance of a sentence involves three things: the *speaker* of the sentence, the *act* described by the sentence, and the *performer* of the act. If only for the sake of remembering the six verb features above, one can make associations as follows:

1. mood: speaker
2. aspect: act
3. number: performer
4. voice: performer–act
5. person: speaker–performer
6. tense: act–speaker.

First-person verbs are rare in Euclid. As noted above, λέγω 'I say' is used at the beginning of specifications of theorems, and a few other places. Also, δείξομεν 'we shall show' is used a few times. The other verbs are in the third person.

Of the 48 propositions of Book I, 14 have enunciations of the form Ἐάν + SUBJUNCTIVE.

Often in sentences of the logical form 'If A, then B', Euclid will express 'If A' as a *genitive absolute,* a noun and participle in the genitive case. We use the corresponding absolute construction in English.

Translation

	genitive	dative	accusative
ἀπό	from		
διά	through [a point]		owing to
ἐν		in	
ἐξ	from [the beginning]		
ἐπι	on		to
κατά			at [a point]
μετά	with		
παρά	along [a straight line]		
περί			about
πρός		at/on	at [right angles]
ὑπό	by		under

Table 6: Greek prepositions

The Perseus website,[16] with its Word Study Tool, is useful for parsing. However, in the work of interpreting the Greek, we also consult print resources, such as Smyth's *Greek Grammar* [16], the *Greek-English Lexicon* of Liddell, Scott, and Jones [10], the *Pocket Oxford Classical Greek Dictionary* [11], and Heath's translation of the *Elements* [3, 2].

There are online lessons on reading Euclid in Greek.[17]

In translating Euclid into English, Heath seems to stay as close to Euclid as possible, under the requirement that the translation still read well *as English.* There may be subtle ways in which Heath imposes modern ways of thinking that are foreign to Euclid.

The English translation here tries to stay even closer to Euclid than Heath does. The purpose of the translation is to elucidate the original Greek. This means the translation may not read so well as English. In particular, word order may be odd. Simple declarative sentences in English normally have the order SUBJECT-VERB-OBJECT (or SUBJECT-COPULA-PREDICATE). When Euclid uses another order, say SUBJECT-OBJECT-VERB (or SUBJECT-PREDICATE-COPULA), the translation *may* follow him. There is a precedent for such variations in English order, albeit from a few centuries ago. For example, there is the rendition by George Chapman (1559?–1634) of Homer's *Iliad* [13]. Chapman begins his version of Homer thus:

> Achilles' banefull wrath resound, O Goddesse, that imposd
> Infinite sorrowes on the Greekes, and many brave soules losd
> From breasts Heroique—sent them farre, to that invisible cave
> That no light comforts; and their lims to dogs and vultures gave.
> To all which Jove's will gave effect; from whom first strife begunne
> Betwixt Atrides, king of men, and Thetis' god-like Sonne.

The word order SUBJECT-PREDICATE-COPULA is seen also in the lines of Sir Walter Raleigh (1554?–1618), quoted approvingly by Henry David Thoreau (1817–62) [18]:

> But men labor under a mistake. The better part of the man is soon plowed into the soil for compost. By a seeming fate, commonly called necessity, they are employed, as it says in an old book, laying up treasures which moth and rust will corrupt and thieves break through and steal.[18] It is a fool's life, as they will find when they get to the end of it, if not before. It is said that Deucalion and Pyrrha created men by throwing stones over their heads behind them:—
>
> *"Inde genus durum sumus, experiensque laborum,*
> *Et documenta damus qua simus origine nati."*
>
> Or, as Raleigh rhymes it in his sonorous way,—
>
> *"From thence our kind hard-hearted is, enduring pain and care,*
> *Approving that our bodies of a stony nature are."*
>
> So much for a blind obedience to a blundering oracle, throwing the stones over their heads behind them, and not seeing where they fell.[19]

More examples:

> The man recovered of the bite,
> The dog it was that died.[20]

> Whose woods these are I think I know.
> His house is in the village though;
> He will not see me stopping here
> To watch his woods fill up with snow.[21]

[16] `http://www.perseus.tufts.edu/hopper/collection?collection=Perseus\%3Acorpus\%3Aperseus\%2Cwork\%2CEuclid\%2C\%20Elements`

[17] `http://www.du.edu/~etuttle/classics/nugreek/contents.htm`

[18] The Gospel According to St Matthew, 6:19: 'Lay not up for yourselves treasures upon earth, where moth and rust doth corrupt, and where thieves break through and steal'.

[19] Text taken from `http://www.gutenberg.org/files/205/205-h/205-h.htm`, July 6, 2011.

[20] The last lines of 'An Elegy on the Death of a Mad Dog' by Oliver Goldsmith (1728-1774) (`http://www.poetry-archive.com/g/an_elegy_on_the_death_of_a_mad_dog.html`, accessed July 12, 2011).

[21] The first stanza of 'Stopping by Woods on a Snowy Evening' by Robert Frost (`http://www.poetryfoundation.org/poem/171621`, accessed July 12, 2011).

Giriş

Sayfa düzeni ve Metin

Öklid'in *Öğeler*inin birinci kitabı, burada üç sütun halinde sunuluyor: orta sütunda orijinal Yunanca metin, onun solunda bir İngilizce çevirisi ve sağında bir Türkçe çevirisi yer alıyor.

Öklid'in *Öğeler*i, her biri **önermelere** bölünmüş olan 13 kitaptan oluşur. Bazı kitaplarda **tanımlar** da vardır. Birinci kitap ayrıca **postülatları** ve **genel kavramları** da içerir. Yunanca metnin her önermesinin her cümlesi öyle birimlere bölünmüştür ki

1. her birim bir satıra sığar,
2. birimler cümle içinde bir rol oynarlar
3. İngilizceye çevirirken birimlerin sırasını korumak anlamlı olur.

*Öğeler*in her önermesinin yanında, çoğu noktanın (ve bazı çizgilerin) harflerle isimlendirildiği, bir çizgi ve noktalar resmi yer alır. Bu resim **harfli diagramdır**. Her önermede diagramı kelimelerin *sonuna* yerleştiriyoruz. Reviel Netz'e göre orijinal ruloda diagram burada yer alırdı ve böylece okuyan önermeyi okumak için ruloyu ne kadar açması gerektiğini bilirdi [12, p. 35, n. 55].

Öklid'in yazdıklarının çeşitli süzgeçlerden geçmiş haline ulaşabiliyoruz. Öğelerin M. Ö. 300 civarında yazılmış olması gerekir. Bizim kullandığımız 1883'te yayınlanan Heiberg versiyonu onuncu yüzyılda Vatikan'da yazılan bir elyazmasına dayanmaktadır.

Analiz

*Öğeler*in her önermesi bir **problem** veya bir **teorem** olarak anlaşılabilir. M.S. 320 civarında yazan İskenderiyeli Pappus bu ayrımı tarif ediyor [17, pp. 564–567] :

> Geometrik araştırmada daha teknik terimleri tercih edenler
>
> - **problem** (πρόβλημα) terimini içinde [birşey] yapılması veya inşa edilmesi önerilen [bir önerme] anlamında; ve
> - **teorem** (θεώρημα) terimini içinde belirli bir hipotezin sonuçlarının ve gerekliliklerinin incelendiği [bir önerme] anlamında;
>
> kullanırlar ama antiklerin bazıları bunların tümünü problem, bazıları da teorem olarak tarif etmiştir.

Kısaca, bir problem birşey *yapmayı* önerir; bir teorem birşeyi *görmeyi.* (Yunancada *Teorem* kelimesi daha genel olarak 'bakılmış olan' anlamındadır ve θεάομαι 'bak' fiiliyle ilgilidir; burdan ayrıca θέατρον 'theater' kelimesi de türemiştir.)

İster bir problem, ister bir teorem olsun, bir önerme—ya da daha tam anlamıyla bir önermenin *metni* —altı parçaya kadar ayrılıp analiz edilebilir. Öklid'in Heath çevirisinin The Green Lion baskısı [3, p. xxiii] bu analizi Proclus'un *Commentary on the First Book of Euclid's* Elements [14, p. 159] kitabında bulunan haliyle tarif eder. M.S., beşinci yüzyılda Proclus[22] şöyle yazmıştır:

> Bütün parçalarıyla donatılmış her problem ve teorem aşağıdaki öğeleri içermelidir:
>
> 1) bir **ilan** (πρότασις),
> 2) bir **açıklama** (ἔκθεσις),
> 3) bir **belirtme** (διορισμός),
> 4) bir **hazırlama** (κατασκευή),
> 5) bir **gösteri** (ἀπόδειξις), and
> 6) bir **bitirme** (συμπέρασμα).
>
> Bunlardan, ilan, verileni ve bundan ne sonuç elde edileceğini belirtir çünkü mükemmel bir ilan bu iki parçanın ikisini de içerir. Açıklama, verileni ayrıca ele alır ve bunu daha sonra incelemede kullanılmak üzere hazırlar. Belirtme, elde edilecek sonucu ele alır ve onun ne olduğunu kesin bir şekilde açıklar. Hazırlama, elde edilecek sonuca ulaşmak için verilende neyin eksik olduğunu söyler. Gösteri, önerilen çıkarımı kabul edilen önermelerden bilimsel akıl yürütmeyle oluşturur. Bitirme, ilana geri dönerek ispatlanmış olanı onaylar.
>
> Bir problem veya teoremin parçaları arasında en önemli olanları, her zaman bulunan, ilan, gösteri ve bitirmedir.

Biz de Proclus'un analizini aşağıdaki anlamıyla kullanacağız:

1. *İlan,* bir önermenin, harfli diagrama gönderme yapmayan, genel beyanıdır. Bu beyan, bir doğru veya üçgen gibi bir nesne hakkındadır.

2. *Açıklamada,* bu nesne diagramla harfler aracılığıyla özdeşleştirilir. Bu nesnenin varlığı üçüncü tekil emir kipinde bir fiil ile oluşturulur.

3. (a) *Belirtme,* bir *problemde*, nesne ile ilgili ne yapılacağını söyler ve δεῖ δή kelimeleriyle başlar. Burada δεῖ, 'gereklidir' , δή ise 'şimdi' anlamındadır.

[22]Proclus Bizans (yani, Konstantinapolis, şimdi İstanbul) doğumludur, ama aslında Likyalıdır, ve ilk eğitimini Ksantos'ta almıştır. Felsefe öğrenmek için İskenderiye'ye ve sonra da Atina'ya gitmiştir. [14, p. xxxix].

(b) Bir *teoremde* belirtme, nesneyle ilgili neyin ispatlanacağını söyler ve 'İddia ediyorum ki' anlamına gelen λέγω ὅτι kelimeleriyle başlar. Aynı ifade, bir problemde de belirtmeye ek olarak, gösterinin başında, hazırlamanın sonunda görülebilir.

4. *Hazırlamada,* eğer varsa, ikinci kelime γάρ, onaylayıcı bir zarf ve sebep belirten bir bağlaçtır. Bu kelimeyi cümlenin birinci kelimesi 'çünkü' olarak çeviriyoruz.

5. *Gösteri* genellikle ἐπεί 'çünkü, olduğundan' ilgeciyle başlar.

6. *Bitirme*, ilanı tekrarlar ve genellikle 'dolayısıyla' ilgecini içerir. Tekrarlanan ilandan sonra bitirme aşağıdaki iki kalıptan biriyle sonlanır:

(a) ὅπερ ἔδει ποιῆσαι 'yapılması gereken tam buydu' (problemlerde);

(b) ὅπερ ἔδει δεῖξαι 'gösterilmesi gereken tam buydu' (teoremlerde): Latince, *quod erat demonstrandum,* veya QED.

Dil

Öklid'in kullandığı dil: *Antik* Yunancadır. Bu dil Hint-Avrupa dilleri ailesindendir. İngilizce de bu ailedendir ancak Türkçe değildir. Fakat bazı yönlerden Türkçe, Yunancaya, İngilizceden daha yakındır. İngilizce ve Türkçenin günümüz bilimsel terminolojisinin kökleri genellikle Yunancadır.

büyük	küçük	okunuş	isim
Α	α	a	alfa
Β	β	b	beta
Γ	γ	g	gamma
Δ	δ	d	delta
Ε	ε	e	epsilon
Ζ	ζ	z (ds)	zeta
Η	η	ê (uzun e)	eta
Θ	ϑ	th	theta
Ι	ι	i	iota (yota)
Κ	ϰ	k	kappa
Λ	λ	l	lambda
Μ	μ	m	mü
Ν	ν	n	nü
Ξ	ξ	ks	ksi
Ο	ο	o (kısa)	omikron
Π	π	p	pi
Ρ	ρ	r	rho (ro)
Σ	σ, ς	s	sigma
Τ	τ	t	tau
Υ	υ	y, ü	üpsilon
Φ	φ	f	phi
Χ	χ	h (kh)	khi
Ψ	ψ	ps	psi
Ω	ω	ô (uzun o)	omega

Table 7: Yunan alfabesi

Chapter 1

Elements

‘Definitions’

Boundaries[1]	Ὅροι	Sınırlar
[1] A point is [that] whose part is nothing.[2]	Σημεῖόν ἐστιν, οὗ μέρος οὐθέν.	Bir nokta, parçası hiçbir şey olandır.
[2] A line, length without breadth.	Γραμμὴ δὲ μῆκος ἀπλατές.	Bir çizgi, ensiz uzunluktur.
[3] Of a line, the extremities are points.	Γραμμῆς δὲ πέρατα σημεῖα.	Bir çizginin uçlarındakiler, noktalardır.
[4] A straight line is whatever [line] evenly with the points of itself lies.	Εὐθεῖα γραμμή ἐστιν, ἥτις ἐξ ἴσου τοῖς ἐφ᾽ ἑαυτῆς σημείοις κεῖται.	Bir doğru, üzerindeki noktalara hizalı uzanan bir çizgidir.
[5] A surface is what has length and breadth only.	Ἐπιφάνεια δέ ἐστιν, ὃ μῆκος καὶ πλάτος μόνον ἔχει.	Bir yüzey, sadece eni ve boyu olandır.
[6] Of a surface, the boundaries are lines.	Ἐπιφανείας δὲ πέρατα γραμμαί.	Bir yüzeyin uçlarındakiler, çizgilerdir.
[7] A plane surface is what [surface] evenly with the points of itself lies.	Ἐπίπεδος ἐπιφάνειά ἐστιν, ἥτις ἐξ ἴσου ταῖς ἐφ᾽ ἑαυτῆς εὐθείαις κεῖται.	Bir düzlem, üzerindeki doğruların noktalarıyla hizalı uzanan bir yüzeydir.
[8] A plane angle is, . . .[3] in a plane, two lines taking hold of one another, and not lying on a STRAIGHT, to one another the inclination of the lines.	Ἐπίπεδος δὲ γωνία ἐστὶν ἡ ἐν ἐπιπέδῳ δύο γραμμῶν ἁπτομένων ἀλλήλων καὶ μὴ ἐπ᾽ εὐθείας κειμένων πρὸς ἀλλήλας τῶν γραμμῶν κλίσις.	Bir düzlem açısı, bir düzlemde kesişen ve aynı doğru üzerinde uzanmayan iki çizginin birbirine göre eğikliğidir.
[9] Whenever the lines containing the angle be straight, rectilineal is called the angle.	Ὅταν δὲ αἱ περιέχουσαι τὴν γωνίαν γραμμαὶ εὐθεῖαι ὦσιν, εὐθύγραμμος καλεῖται ἡ γωνία.	Ve açıyı içeren çizgiler birer doğru olduğu zaman düzkenar, denir açıya.
[10] Whenever a STRAIGHT,	Ὅταν δὲ εὐθεῖα	Bir doğru başka bir doğrunun üzerine yerleşip

[1] The usual translation is ‘definitions’, but what follow are not really definitions in the modern sense.

[2] Presumably subject and predicate are inverted here, so the sense is that of ‘A point is that of which nothing is a part.’

[3] There is no way to put ‘the’ here to parallel the Greek.

standing on a STRAIGHT, the adjacent angles equal to one another make, right either of the equal angles is, and the STRAIGHT that has been stood is called perpendicular to that on which it has been stood.[4]	ἐπ᾽ εὐθεῖαν σταθεῖσα τὰς ἐφεξῆς γωνίας ἴσας ἀλλήλαις ποιῇ, ὀρθὴ ἑκατέρα τῶν ἴσων γωνιῶν ἐστι, καὶ ἡ ἐφεστηκυῖα εὐθεῖα κάθετος καλεῖται, ἐφ᾽ ἣν ἐφέστηκεν.	birbirine eşit bitişik açılar oluşturduğunda, eşit açıların her birine dik açı, ve diğerinin üzerinde duran doğruya da; üzerinde durduğu doğruya bir dik doğru denir.
[11] An obtuse angle is that [which is] greater than a RIGHT.	Ἀμβλεῖα γωνία ἐστὶν ἡ μείζων ὀρθῆς.	Bir geniş açı, büyük olandır bir dik açıdan.
[12] Acute, that less than a RIGHT.	Ὀξεῖα δὲ ἡ ἐλάσσων ὀρθῆς.	Bir dar açı, küçük olandır bir dik açıdan.
[13] A boundary is whis is a limit of something.	Ὅρος ἐστίν, ὅ τινός ἐστι πέρας.	Bir *sınır,* bir şeyin ucunda olandır.
[14] A figure is what is contained by some boundary or boundaries.[5]	Σχῆμά ἐστι τὸ ὑπό τινος ἤ τινων ὅρων περιεχόμενον.	Bir figür, bir sınır tarafından veya sınırlarca içerilendir.
[15] A circle is a plane figure contained by one line [which is called the circumference] to which, from one point of those lying inside of the figure all STRAIGHTS falling [to the circumference of the circle] are equal to one another.	Κύκλος ἐστὶ σχῆμα ἐπίπεδον ὑπὸ μιᾶς γραμμῆς περιεχόμενον [ἣ καλεῖται περιφέρεια], πρὸς ἣν ἀφ᾽ ἑνὸς σημείου τῶν ἐντὸς τοῦ σχήματος κειμένων πᾶσαι αἱ προσπίπτουσαι εὐθεῖαι [πρὸς τὴν τοῦ κύκλου περιφέρειαν] ἴσαι ἀλλήλαις εἰσίν.	Bir daire, düzlemdeki bir çizgice içerilen [bu çizgiye çember denir] bir figürdür öyle ki figürün içerisindeki noktaların birinden çizgi üzerine gelen tüm doğrular, birbirine eşittir;
[16] A[6] center of the circle the point is called.	Κέντρον δὲ τοῦ κύκλου τὸ σημεῖον καλεῖται.	Ve o noktaya, dairenin merkezi denir.
[17] A diameter of the circle is some STRAIGHT drawn through the center and bounded to either parts by the circumference of the circle, which also bisects the circle.	Διάμετρος δὲ τοῦ κύκλου ἐστὶν εὐθεῖά τις διὰ τοῦ κέντρου ἠγμένη καὶ περατουμένη εφ᾽ ἑκάτερα τὰ μέρη ὑπὸ τῆς τοῦ κύκλου περιφερείας, ἥτις καὶ δίχα τέμνει τὸν κύκλον.	Bir dairenin bir çapı, dairenin merkezinden geçip her iki tarafta da dairenin çevresindeki çemberce sınırlanan bir doğrudur ve böyle bir doğru, daireyi ikiye böler.
[18] A semicircle is the figure contained by the diameter and the circumference taken off by it. A center of the semicircle [is] the same which is also of the circle.	Ἡμικύκλιον δέ ἐστι τὸ περιεχόμενον σχῆμα ὑπό τε τῆς διαμέτρου καὶ τῆς ἀπολαμβανομένης ὑπ᾽ αὐτῆς περιφερείας. κέντρον δὲ τοῦ ἡμικυκλίου τὸ αὐτό, ὃ καὶ τοῦ κύκλου ἐστίν.	Bir yarıdaire, bir çap ve onun kestiği bir çevrece içerilen figürdür, ve yarıdairenin merkezi, o dairenin merkeziyle aynıdır.
[19] Rectilineal figures are[7] those contained by STRAIGHTS, triangles, by three, quadrilaterals, by four, polygons,[8] by more than four STRAIGHTS contained.	Σχήματα εὐθύγραμμά ἐστι τὰ ὑπὸ εὐθειῶν περιεχόμενα, τρίπλευρα μὲν τὰ ὑπὸ τριῶν, τετράπλευρα δὲ τὰ ὑπὸ τεσσάρων, πολύπλευρα δὲ τὰ ὑπὸ πλειόνων ἢ τεσσάρων	*Düzkenar figür*ler, doğrularca içerilenlerdir. *Üçkenar* figürler üç, *dörtkenar* figürler dört ve *çokkenar* figürler ise dörtten daha fazla doğruca içerilenlerdir.

[4] This definition is quoted in Proposition 12.

[5] In Greek what is repeated is not ‘boundary’ but ‘some’.

[6] None of the terms defined in this section is preceeded by a definite article. In particular, what is being defined here is not *the* center of a circle, but *a* center. However, it is easy to show that the center of a given circle is unique; also, in Proposition III.1, Euclid finds *the* center of a given circle.

	εὐθειῶν περιεχόμενα.	
[20] There being trilateral figures, an equilateral triangle is that having three sides equal, isosceles, having only two sides equal, scalene, having three unequal sides.	ὧν δὲ τριπλεύρων σχημάτων ἰσόπλευρον μὲν τρίγωνόν ἐστι τὸ τὰς τρεῖς ἴσας ἔχον πλευράς, ἰσοσκελὲς δὲ τὸ τὰς δύο μόνας ἴσας ἔχον πλευράς, σκαληνὸν δὲ τὸ τὰς τρεῖς ἀνίσους ἔχον πλευράς.	Üçkenar figürlerden bir eşkenar üçgen, üç kenarı eşit olan, ikizkenar, eşit iki kenarı olan çeşitkenar, üç kenarı eşit olmayandır.
[21] Yet of trilateral figures, a right-angled triangle is that having a right angle, obtuse-angled, having an obtuse angle, acute-angled, having three acute angles.	Ἔτι δὲ τῶν τριπλεύρων σχημάτων ὀρθογώνιον μὲν τρίγωνόν ἐστι τὸ ἔχον ὀρθὴν γωνίαν, ἀμβλυγώνιον δὲ τὸ ἔχον ἀμβλεῖαν γωνίαν, ὀξυγώνιον δὲ τὸ τὰς τρεῖς ὀξείας ἔχον γωνίας.	Ayrıca, üçkenar figürlerden, bir dik üçgen, bir dik açısı olan, geniş açılı, bir geniş açısı olan, dar açılı, üç açısı dar açı olandır.
[22] Of quadrilateral figures, a square is what is equilateral and right-angled, an oblong, right-angled, but not equilateral, a rhombus, equilateral, but not right-angled, rhomboid, having opposite sides and angles equal, which is neither equilateral nor right-angled; and let quadrilaterals other than these be called trapezia.	Τῶν δὲ τετραπλεύρων σχημάτων τετράγωνον μέν ἐστιν, ὃ ἰσόπλευρόν τέ ἐστι καὶ ὀρθογώνιον, ἑτερόμηκες δέ, ὃ ὀρθογώνιον μέν, οὐκ ἰσόπλευρον δέ, ῥόμβος δέ, ὃ ἰσόπλευρον μέν, οὐκ ὀρθογώνιον δέ, ῥομβοειδὲς δὲ τὸ τὰς ἀπεναντίον πλευράς τε καὶ γωνίας ἴσας ἀλλήλαις ἔχον, ὃ οὔτε ἰσόπλευρόν ἐστιν οὔτε ὀρθογώνιον· τὰ δὲ παρὰ ταῦτα τετράπλευρα τραπέζια καλείσθω.	Dörtkenar figürlerden bir kare, hem eşit kenar hem de dik-açılı olan, bir dikdörtgen, dik-açılı olan ama eşit kenar olmayan, bir eşkenar dörtgen, eşit kenar olan ama dik-açılı olmayan, bir paralelkenar karşılıklı kenar ve açıları eşit olan ama eşit kenar ve dik-açılı olmayandır. Ve bunların dışında kalan dörtkenarlara yamuk denilsin.
[23] Parallels are STRAIGHTs, whichever, being in the same plane, and extended to infinity to either parts, to neither [parts] fall together with one another.	Παράλληλοί εἰσιν εὐθεῖαι, αἵτινες ἐν τῷ αὐτῷ ἐπιπέδῳ οὖσαι καὶ ἐκβαλλόμεναι εἰς ἄπειρον ἐφ᾽ ἑκάτερα τὰ μέρη ἐπὶ μηδέτερα συμπίπτουσιν ἀλλήλαις.	Paraleller, aynı düzlemde bulunan ve her iki yönde de sınırsızca uzatıldıklarında hiçbir noktada kesişmeyen doğrulardır.

[7] As in Turkish, so in Greek, a plural subject can take a singular verb, when the subject is of the neuter gender in Greek, or names inanimate objects in Turkish.

[8] To maintain the parallelism of the Greek, we could (like Heath) use 'trilateral', 'quadrilateral', and 'multilateral' instead of 'triangle', 'quadrilateral', and 'polygon'. Today, triangles and quadrilaterals *are* polygons. For Euclid, they are not: you never call a triangle a polygon, because you can give the more precise information that it is a triangle.

Postulates

Postulates	Αἰτήματα	Postulatlar
Let it have been postulated	Ἠιτήσθω	Postulat olarak kabul edilsin
from any point	ἀπὸ παντὸς σημείου	herhangi bir noktadan
to any point	ἐπὶ πᾶν σημεῖον	herhangi bir noktaya
a straight line	εὐθεῖαν γραμμὴν	bir doğru
to draw.	ἀγαγεῖν.	çizilmesi.
Also, a bounded straight	Καὶ πεπερασμένην εὐθεῖαν	Ve sonlu bir doğrunun
continuously	κατὰ τὸ συνεχὲς	kesiksiz şekilde
in a straight	ἐπ᾽ εὐθείας	bir doğruda
to extend.	ἐκβαλεῖν.	uzatılması.
Also, to any center	Καὶ παντὶ κέντρῳ	Ve her merkez
and distance	καὶ διαστήματι	ve uzunluğa
a circle	κύκλον	bir daire
to draw.	γράφεσθαι.	çizilmesi.
Also, all right angles	Καὶ πάσας τὰς ὀρθὰς γωνίας	Ve bütün dik açıların
equal to one another	ἴσας ἀλλήλαις	bir birine eşit
to be.	εἶναι.	olduğu.
Also, if in two straight lines	Καὶ ἐὰν εἰς δύο εὐθείας εὐθεῖα	Ve iki doğruyu
falling	ἐμπίπτουσα	kesen bir doğrunun
the interior angles to the same parts	τὰς ἐντὸς καὶ ἐπὶ τὰ αὐτὰ μέρη γωνίας	aynı tarafta oluşturduğu
less than two rights make,	δύο ὀρθῶν ἐλάσσονας ποιῇ,	iç açılar iki dik açıdan küçükse,
the two straights, extended	ἐκβαλλομένας τὰς δύο εὐθείας	bu iki doğrunun,
to infinity,	ἐπ᾽ ἄπειρον	sınırsızca uzatıldıklarında
fall together,	συμπίπτειν,	açıların
to which parts are	ἐφ᾽ ἃ μέρη εἰσὶν	iki dik açıdan küçük olduğu tarafta
the less than two rights.	αἱ τῶν δύο ὀρθῶν ἐλάσσονες.	kesişeceği.

Common Notions

Common notions	Κοιναὶ ἔννοιαι	Genel Kavramlar
Equals to the same also to one another are equal.	Τὰ τῷ αὐτῷ ἴσα καὶ ἀλλήλοις ἐστὶν ἴσα.	Aynı şeye eşitler birbirlerine de eşittir.
Also, if to equals equals be added, the wholes are equal.	Καὶ ἐὰν ἴσοις ἴσα προστεθῇ, τὰ ὅλα ἐστὶν ἴσα.	Eğer eşitlere eşitler eklenirse, elde edilenler de eşittir.
Also, if from equals equals be taken away, the remainders are equal.	αὶ ἐὰν ἀπὸ ἴσων ἴσα ἀφαιρεθῇ, τὰ καταλειπόμενά ἐστιν ἴσα.	Eğer eşitlerden eşitler çıkartılırsa, kalanlar eşittir.
Also things applying to one another are equal to one another.	Καὶ τὰ ἐφαρμόζοντα ἐπ᾽ ἀλλήλα ἴσα ἀλλήλοις ἐστίν.	Birbiriyle çakışan şeyler birbirine eşittir.
Also, the whole than the part is greater.	Καὶ τὸ ὅλον τοῦ μέρους μεῖζόν [ἐστιν].	Bütün, parçadan büyüktür.

1.1

On the[1] given bounded STRAIGHT for[2] an equilateral triangle to be constructed.	Ἐπὶ τῆς δοθείσης εὐθείας πεπερασμένης τρίγωνον ἰσόπλευρον συστήσασθαι.	Verilmiş sınırlanmış doğruya eşkenar üçgen inşa edilmesi.
Let be[3] the given bounded STRAIGHT AB.	Ἔστω ἡ δοθεῖσα εὐθεῖα πεπερασμένη ἡ AB.	Verilmiş sınırlanmış doğru AB olsun.
It is necessary then on the STRAIGHT AB for an equilateral triangle to be constructed.[4]	Δεῖ δὴ ἐπὶ τῆς AB εὐθείας τρίγωνον ἰσόπλευρον συστήσασθαι.	Şimdi gereklidir AB doğrusuna eşkenar üçgenin inşa edilmesi.
To center A at distance AB suppose a circle has been drawn, [namely] ΒΓΔ, and moreover, to center B at distance BA suppose a circle has been drawn, [namely] ΑΓΕ, and from the point Γ, where the circles cut one another, to the points A and B, suppose there[5] have been joined the STRAIGHTs ΓΑ and ΓΒ.	Κέντρῳ μὲν τῷ A διαστήματι δὲ τῷ AB κύκλος γεγράφθω ὁ ΒΓΔ, καὶ πάλιν κέντρῳ μὲν τῷ B διαστήματι δὲ τῷ BA κύκλος γεγράφθω ὁ ΑΓΕ, καὶ ἀπὸ τοῦ Γ σημείου, καθ᾽ ὃ τέμνουσιν ἀλλήλους οἱ κύκλοι, ἐπί τὰ A, B σημεῖα ἐπεζεύχθωσαν εὐθεῖαι αἱ ΓΑ, ΓΒ.	A merkezine, AB uzaklığında olan çember çizilmiş olsun, ΒΓΔ, ve yine B merkezine, BA uzaklığında olan çember çizilmiş olsun, ΑΓΕ, çemberlerin kesiştiği Γ noktasından A, B noktalarına ΓΑ, ΓΒ doğruları birleştirilmiş olsun.
And since the point A is the center of the circle ΓΔΒ, equal is ΑΓ to AB; moreover, since the point B is the center of the circle ΓΑΕ, equal is ΒΓ to BA.	Καὶ ἐπεὶ τὸ A σημεῖον κέντρον ἐστὶ τοῦ ΓΔΒ κύκλου, ἴση ἐστὶν ἡ ΑΓ τῇ AB· πάλιν, ἐπεὶ τὸ B σημεῖον κέντρον ἐστὶ τοῦ ΓΑΕ κύκλου, ἴση ἐστὶν ἡ ΒΓ τῇ BA.	Ve A noktası ΓΔΒ çemberinin merkezi olduğu için, ΑΓ, AB doğrusuna eşittir. Dahası B noktası ΓΑΕ çemberinin merkezi olduğu için, ΒΓ, BA doğrusuna eşittir.

[1] Heath's translation has the indefinite article 'a' here, in accordance with modern mathematical practice. However, Euclid does use the Greek *definite* article here, just as in the *exposition* (see §). In particular, he uses the definite article as a *generic* article, which 'makes a single object the representative of the entire class' [16, ¶1123, p. 288]. English too has a generic use of the definite article, 'to indicate the class or kind of objects, as in the well-known aphorism: ***The** child is the father of the man*' [6, p. 76]. (However, the enormous *Cambridge Grammar* does not discuss the generic article in the obvious place [7, 5.6.1, pp. 568–71]. By the way, the 'well-known aphorism' is by Wordsworth; see `http://en.wikisource.org/wiki/Ode:_Intimations_of_Immortality_from_Recollections_of_Early_Childhood` [accessed July 27, 2011].) See note 1 to Proposition 9 below.

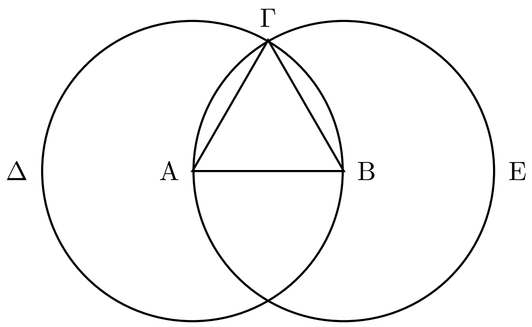
[2] The Greek form of the enunciation here is an infinitive clause, and the subject of such a clause is generally in the accusative case [16, ¶1972, p. 438]. In English, an infinitive clause with expressed subject (as here) is always preceded by 'for' [7, 14.1.3, p. 1178]. Normally such a clause, in Greek or English, does not stand by itself as a complete sentence; here evidently it is expected to. Note that the Greek infinitive is thought to be originally a noun in the dative case [16, ¶1969, p. 438]; the English infinitive with 'to' would seem to be formed similarly.

[3] We follow Euclid in putting the verb (a third-person imperative) first; but a smoother translation of the exposition here would be, 'Let the given finite straight line be AB.' Heath's version is, 'Let *AB* be the given finite straight line.' By the argument of Netz [12, pp. 43–4], this would appear to be a misleading translation, if not a mistranslation. Euclid's expression ἡ AB, 'the AB', must be understood as an abbreviation of ἡ εὐθεῖα γραμμὴ ἡ AB or ἡ AB εὐθεῖα γραμμή, 'the straight line AB'. In Proposition XIII.4, Euclid says, Ἔστω εὐθεῖα ἡ AB, which Heath translates as 'Let *AB* be a straight line'; but then this suggests the expansion 'Let the straight line *AB* be a straight line', which does not make much sense. Netz's translation is, 'Let there be a straight line, [namely] *AB*.' The argument is that Euclid does *not* use words to establish a correlation between letters like *A* and *B* and points. The correlation has already been established in the diagram that is before us. By saying, Ἔστω εὐθεῖα ἡ AB, Euclid is simply calling our attention to a part of the diagram. Now, in the present proposition, Heath's translation of the exposition is expanded to, 'Let the straight line *AB* be the given finite straight line', which does seem to make sense, at least if it can be expanded further to 'Let the finite straight line *AB* be the given finite straight line.' But, unlike *AB*, the given finite straight line was already mentioned in the enunciation, so it is less misleading to name this first in the exposition.

[4] Slightly less literally, 'It is necessary that on the STRAIGHT AB, an equilateral triangle be constructed.'

[5] Instead of 'suppose there have been joined', we could write 'let there have been joined'. However, each of these translations of a Greek *third*-person imperative begins with a second-person imperative (because there is no third-person imperative form in English, except in some fixed forms like 'God bless you'). The logical subject of the verb 'have been joined' is 'the STRAIGHT AB'; since this comes after the verb, it would appear to be an *extraposed subject* in the sense of the *Cambridge Grammar of the English Language* [7, 2.16, p. 67]. Then the grammatical subject of 'have been joined' is 'there', used as a *dummy;* but it will not always be appropriate to use a dummy in such situations [7, 16.63, p. 1402–3].

And ΓΑ was shown equal to ΑΒ; therefore either of ΓΑ and ΓΒ to ΑΒ is equal. But equals to the same are also equal to one another; therefore also ΓΑ is equal to ΓΒ. Therefore the three ΓΑ, ΑΒ, and ΒΓ are equal to one another.	ἐδείχθη δὲ καὶ ἡ ΓΑ τῇ ΑΒ ἴση· ἑκατέρα ἄρα τῶν ΓΑ, ΓΒ τῇ ΑΒ ἐστιν ἴση. τὰ δὲ τῷ αὐτῷ ἴσα καὶ ἀλλήλοις ἐστὶν ἴσα· καὶ ἡ ΓΑ ἄρα τῇ ΓΒ ἐστιν ἴση· αἱ τρεῖς ἄρα αἱ ΓΑ, ΑΒ, ΒΓ ἴσαι ἀλλήλαις εἰσίν.	Ve ΓΑ doğrusunun, ΑΒ doğrusuna eşit olduğu gösterilmişti. O zaman ΓΑ, ΓΒ doğrularının her biri ΑΒ doğrusuna eşittir. Ama aynı şeye eşit olanlar birbirine eşittir. O zaman ΓΑ, ΓΒ doğrusuna eşittir. O zaman o üç doğru, ΓΑ, ΑΒ, ΒΓ, birbirine eşittir.
Equilateral therefore is triangle ΑΒΓ. Also, it has been constructed on the given bounded STRAIGHT ΑΒ; —just what it was necessary to do.	Ἰσόπλευρον ἄρα ἐστὶ τὸ ΑΒΓ τρίγωνον. καὶ συνέσταται ἐπὶ τῆς δοθείσης εὐθείας πεπερασμένης τῆς ΑΒ.[6] ὅπερ ἔδει ποιῆσαι.	Eşkenardır dolayısıyla, ΑΒΓ üçgeni ve inşa edilmiştir verilmiş sınırlanmış, ΑΒ doğrusuna; —yapılması gereken tam buydu.



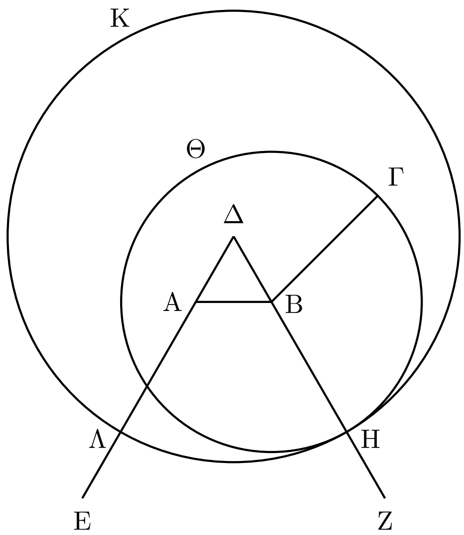
1.2

At the given point, equal to the given STRAIGHT, for a STRAIGHT to be placed.	Πρὸς τῷ δοθέντι σημείῳ τῇ δοθείσῃ εὐθείᾳ ἴσην εὐθεῖαν θέσθαι.	Verilmiş noktaya verilmiş doğruya eşit olan bir doğrunun konulması.
Let be the given point Α, and the given STRAIGHT, ΒΓ.	Ἔστω τὸ μὲν δοθὲν σημεῖον τὸ Α, ἡ δὲ δοθεῖσα εὐθεῖα ἡ ΒΓ·	Verilmiş nokta Α olsun, verilmiş doğru ΒΓ.
It is necessary then at the point Α equal to the given STRAIGHT ΒΓ for a STRAIGHT to be placed.	δεῖ δὴ πρὸς τῷ Α σημείῳ τῇ δοθείσῃ εὐθείᾳ τῇ ΒΓ ἴσην εὐθεῖαν θέσθαι.	Gereklidir Α noktasına, ΒΓ doğrusuna eşit olan bir doğrunun konulması.
For, suppose there has been joined from the point Α to the point Β a STRAIGHT, ΑΒ, and there has been constructed on it an equilateral triangle, ΔΑΒ, and suppose there have been extended on a STRAIGHT[1] with ΔΑ and ΔΒ the STRAIGHTs ΑΕ and ΒΖ, and to the center Β at distance ΒΓ suppose a circle has been drawn, ΓΗΘ, and again to the center Δ at distance ΔΗ suppose a circle has been drawn,	Ἐπεζεύχθω γὰρ ἀπὸ τοῦ Α σημείου ἐπί τὸ Β σημεῖον εὐθεῖα ἡ ΑΒ, καὶ συνεστάτω ἐπ᾽ αὐτῆς τρίγωνον ἰσόπλευρον τὸ ΔΑΒ, καὶ ἐκβεβλήσθωσαν ἐπ᾽ εὐθείας ταῖς ΔΑ, ΔΒ εὐθεῖαι αἱ ΑΕ, ΒΖ, καὶ κέντρῳ μὲν τῷ Β διαστήματι δὲ τῷ ΒΓ κύκλος γεγράφθω ὁ ΓΗΘ, καὶ πάλιν κέντρῳ τῷ Δ καὶ διαστήματι τῷ ΔΗ κύκλος γεγράφθω	Çünkü, birleştirilmiş olsun Α noktasından Β noktasına, ΑΒ doğrusu, ve bu doğru üzerine inşa edilmiş olsun eşkenar üçgen ΔΑΒ, ve uzatılmış olsun, ΔΑ, ΔΒ doğrularından ΑΕ, ΒΖ doğruları ve Β merkezine, ΒΓ uzaklığında, çizilmiş olsun, ΓΗΘ çemberi ve yine Δ merkezine, ΔΗ uzaklığında çizilmiş olsun, ΗΚΛ çemberi .

[6]Normally Heiberg puts a semicolon at this position. Perhaps he has a period here only because he has bracketed the following words (omitted here): 'Therefore, on a given bounded STRAIGHT, an equilateral triangle has been constructed.' According to Heiberg, these words are found, not in the manuscripts of Euclid, but in Proclus's commentary [14, p. 210] alone.

ΗΚΛ.	ὁ ΗΚΛ.	
Since then the point Β is the center of ΓΗΘ,	Ἐπεὶ οὖν τὸ Β σημεῖον κέντρον ἐστὶ τοῦ ΓΗΘ,	Β noktası ΓΗΘ çemberinin merkezi olduğu için,
ΒΓ is equal to ΒΗ.	ἴση ἐστὶν ἡ ΒΓ τῇ ΒΗ.	ΒΓ, ΒΗ doğrusuna eşittir.
Moreover,	πάλιν,	Yine,
since the point Δ is the center of the circle ΚΗΛ,	ἐπεὶ τὸ Δ σημεῖον κέντρον ἐστὶ τοῦ ΗΚΛ κύκλου,	Δ noktası ΗΚΛ çemberinin merkezi olduğu için,
equal is ΔΛ to ΔΗ;	ἴση ἐστὶν ἡ ΔΛ τῇ ΔΗ,	ΔΛ, ΔΗ doğrusuna eşittir,
of these, the [part] ΔΑ to ΔΒ	ὧν ἡ ΔΑ τῇ ΔΒ	ve (birincinin) ΔΑ parçası,
is equal.	ἴση ἐστίν.	(ikincinin) ΔΒ parçasına eşittir.
Therefore the remainder ΑΛ	λοιπὴ ἄρα ἡ ΑΛ	Dolayısıyla ΑΛ kalanı,
to the remainder ΒΗ	λοιπῇ τῇ ΒΗ	ΒΗ kalanına
is equal.	ἐστιν ἴση.	eşittir.
But ΒΓ was shown equal to ΒΗ.	ἐδείχθη δὲ καὶ ἡ ΒΓ τῇ ΒΗ ἴση·	Ve ΒΓ doğrusunun, ΒΗ doğrusuna eşit olduğu gösterilmişti.
Therefore either of ΑΛ and ΒΓ to ΒΗ	ἑκατέρα ἄρα τῶν ΑΛ, ΒΓ τῇ ΒΗ	Dolayısıyla ΑΛ, ΒΓ doğrularının her
is equal.	ἐστιν ἴση.	biri ΒΗ doğrusuna eşittir.
But equals to the same	τὰ δὲ τῷ αὐτῷ ἴσα	Ama aynı şeye eşit olanlar birbirine
also are equal to one another.	καὶ ἀλλήλοις ἐστὶν ἴσα·	eşittir.
And therefore ΑΛ is equal to ΒΓ.	καὶ ἡ ΑΛ ἄρα τῇ ΒΓ ἐστιν ἴση.	Ve dolayısıyla ΑΛ da, ΒΓ doğrusuna eşittir.

Therefore at the given point Α	Πρὸς ἄρα τῷ δοθέντι σημείῳ	Dolayısıyla verilmiş Α noktasına
equal to the given STRAIGHT ΒΓ	τῷ Α τῇ δοθείσῃ εὐθείᾳ τῇ ΒΓ ἴση	verilmiş ΒΓ doğrusuna eşit olan
the STRAIGHT ΑΛ is laid down;	εὐθεῖα κεῖται ἡ ΑΛ·	ΑΛ doğrusu konulmuştur;
—just what it was necessary to do.	ὅπερ ἔδει ποιῆσαι.	—yapılması gereken tam buydu.



1.3

Two unequal STRAIGHTs being given,	Δύο δοθεισῶν εὐθειῶν ἀνίσων	İki eşit olmayan doğru verilmiş ise,
from the greater,	ἀπὸ τῆς μείζονος	daha büyükten
equal to the less,	τῇ ἐλάσσονι ἴσην	daha küçüğe eşit olan
a STRAIGHT to take away.	εὐθεῖαν ἀφελεῖν.	bir doğru kesmek.

Let be	Ἔστωσαν	İki verilmiş doğru
the two given unequal STRAIGHTs	αἱ δοθεῖσαι δύο εὐθεῖαι ἄνισοι	ΑΒ, Γ
ΑΒ and Γ,[1]	αἱ ΑΒ, Γ,	olsunlar;
of which let the greater be ΑΒ.	ὧν μείζων ἔστω ἡ ΑΒ·	daha büyüğü ΑΒ olsun.

It is necessary then	δεῖ δὴ	Gereklidir
from the greater, ΑΒ,	ἀπὸ τῆς μείζονος τῆς ΑΒ	daha büyük olan ΑΒ doğrusundan

[1]The phrase ἐπ᾽ εὐθείας will recur a number of times. The adjective, which is feminine here, appears to be a genitive singular, though it could be accusative plural.

[1]Since Γ is given the feminine gender in the Greek, this is a sign that Γ is indeed a line and not a point. See the Introduction.

equal to the less, Γ,
to take away a STRAIGHT.

τῇ ἐλάσσονι τῇ Γ ἴσην
εὐθεῖαν ἀφελεῖν.

daha küçük olan Γ doğrusuna eşit olan
bir doğru kesmek.

Let there be laid down
at the point A,
equal to the line Γ,
ΑΔ;
and to center A
at distance ΑΔ
suppose circle ΔEZ has been drawn.

Κείσθω
πρὸς τῷ Α σημείῳ
τῇ Γ εὐθείᾳ ἴση
ἡ ΑΔ·
καὶ κέντρῳ μὲν τῷ Α
διαστήματι δὲ τῷ ΑΔ
κύκλος γεγράφθω ὁ ΔΕΖ.

Konulsun
A noktasına
Γ doğrusuna eşit olan
ΑΔ doğrusu.
Ve A merkezine
ΑΔ uzaklığında olan
ΔEZ çemberi çizilmiş olsun.

And since the point A
is the center of the circle ΔEZ,
equal is AE to ΑΔ.
But Γ to ΑΔ is equal.
Therefore either of AE and Γ
is equal to ΑΔ;
and so AE is equal to Γ.

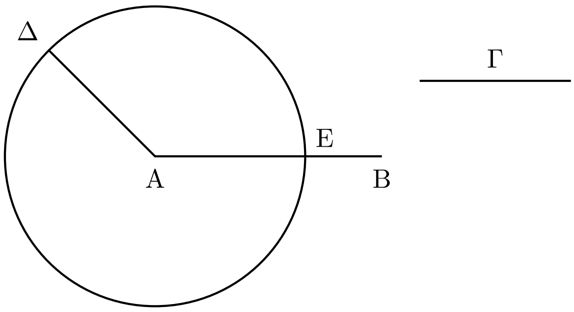
Καὶ ἐπεὶ τὸ Α σημεῖον
κέντρον ἐστὶ τοῦ ΔΕΖ κύκλου,
ἴση ἐστὶν ἡ ΑΕ τῇ ΑΔ·
ἀλλὰ καὶ ἡ Γ τῇ ΑΔ ἐστιν ἴση.
ἑκατέρα ἄρα τῶν ΑΕ, Γ
τῇ ΑΔ ἐστιν ἴση·
ὥστε καὶ ἡ ΑΕ τῇ Γ ἐστιν ἴση.

Ve A noktası
ΔEZ çemberinin merkezi olduğu için,
AE, ΑΔ doğrusuna eşittir.
Ama Γ, ΑΔ doğrusuna eşittir.
Dolayısıyla AE, Γ doğrularının her biri
ΑΔ doğrusuna eşittir.
Sonuç olarak,
AE, Γ doğrusuna eşittir.

Therefore, two unequal STRAIGHTS being given, AB and Γ,
from the greater, AB,
an equal to the less, Γ,
has been taken away, [namely] AE;
—just what it was necessary to do.

Δύο ἄρα δοθεισῶν εὐθειῶν ἀνίσων τῶν ΑΒ, Γ
ἀπὸ τῆς μείζονος τῆς ΑΒ
τῇ ἐλάσσονι τῇ Γ ἴση
ἀφῄρηται ἡ ΑΕ·
ὅπερ ἔδει ποιῆσαι.

Dolayısıyla iki eşit olmayan AB, Γ doğrusu verilmiş ise,
daha büyük olan AB doğrusundan
daha küçük olan Γ doğrusuna eşit olan
AE doğrusu kesilmişti;
—yapılması gereken tam buydu.



1.4

If two triangles
two sides
to two sides
have equal,[1]
either [side] to either,[2]
and angle to angle have equal,
—that which is by the equal STRAIGHTS[3]
contained,
also[4] base to base
they will have equal,
and the triangle to the triangle
will be equal,
and the remaining angles
to the remaining angles
will be equal,
either to either,

Ἐὰν δύο τρίγωνα
τὰς δύο πλευρὰς
[ταῖς] δυσὶ πλευραῖς
ἴσας ἔχῃ
ἑκατέραν ἑκατέρᾳ
καὶ τὴν γωνίαν τῇ γωνίᾳ ἴσην ἔχῃ
τὴν ὑπὸ τῶν ἴσων εὐθειῶν
περιεχομένην,
καὶ τὴν βάσιν τὴ βάσει
ἴσην ἕξει,
καὶ τὸ τρίγωνον τῷ τριγώνῳ
ἴσον ἔσται,
καὶ αἱ λοιπαὶ γωνίαι
ταῖς λοιπαῖς γωνίαις
ἴσαι ἔσονται
ἑκατέρα ἑκατέρᾳ,
ὑφ᾽ ἃς αἱ ἴσαι πλευραὶ ὑποτείνουσιν.

Eğer iki üçgende
iki kenar
iki kenara
eşit olursa
(her biri birine)
ve açı açıya eşit olursa
(yani, eşit doğrular tarafından
içerilen),
hem taban tabana
eşit olacak,
hem üçgen üçgene
eşit olacak,
hem de geriye kalan açılar
geriye kalan açılara
eşit olacak,
her biri birine,
(yani) eşit kenarları görenler.

—those that the equal sides subtend.		
Let be two triangles ΑΒΓ and ΔΕΖ, the two sides ΑΒ and ΑΓ to the two sides ΔΕ and ΔΖ having equal, either to either, ΑΒ to ΔΕ and ΑΓ to ΔΖ, and angle ΒΑΓ to ΕΔΖ equal.	Ἔστω δύο τρίγωνα τὰ ΑΒΓ, ΔΕΖ τὰς δύο πλευρὰς τὰς ΑΒ, ΑΓ ταῖς δυσὶ πλευραῖς ταῖς ΔΕ, ΔΖ ἴσας ἔχοντα ἑκατέραν ἑκατέρᾳ τὴν μὲν ΑΒ τῇ ΔΕ τὴν δὲ ΑΓ τῇ ΔΖ καὶ γωνίαν τὴν ὑπὸ ΒΑΓ γωνίᾳ τῇ ὑπὸ ΕΔΖ ἴσην.	Verilmiş olsun, ΑΒΓ ve ΔΕΖ (adlarında) iki üçgen, iki kenarı ΑΒ, ΑΓ ΔΕ, ΔΖ iki kenarına eşit olan her biri birine, (şöyle ki) ΑΒ, ΔΕ kenarına ve ΑΓ, ΔΖ kenarına, ve ΒΑΓ (tarafından içerilen) açısı ΕΔΖ açısına eşit olan.
I say that the base ΒΓ is equal to the base ΕΖ, and triangle ΑΒΓ will be equal to triangle ΔΕΖ, and the remaining angles to the remaining angles will be equal, either to either, those that equal sides subtend, [namely] ΑΒΓ to ΔΕΖ, and ΑΓΒ to ΔΖΕ.	λέγω, ὅτι καὶ βάσις ἡ ΒΓ βάσει τῇ ΕΖ ἴση ἐστίν, καὶ τὸ ΑΒΓ τρίγωνον τῷ ΔΕΖ τριγώνῳ ἴσον ἔσται, καὶ αἱ λοιπαὶ γωνίαι ταῖς λοιπαῖς γωνίαις ἴσαι ἔσονται ἑκατέρα ἑκατέρᾳ, ὑφ᾽ ἃς αἱ ἴσαι πλευραὶ ὑποτείνουσιν, ἡ μὲν ὑπὸ ΑΒΓ τῇ ὑπὸ ΔΕΖ, ἡ δὲ ὑπὸ ΑΓΒ τῇ ὑπὸ ΔΖΕ.	İddia ediyorum ki, ΒΓ tabanı eşittir ΕΖ tabanına, ve ΑΒΓ üçgeni eşit olacak ΔΕΖ üçgenine, ve geriye kalan açılar eşit olacak geriye kalan açıların, her biri birine, (şöyle ki) eşit kenarları görenler; ΑΒΓ, ΔΕΖ açısına, ΑΓΒ, ΔΖΕ açısına.
For, there being applied triangle ΑΒΓ to triangle ΔΕΖ, and there being placed the point Α on the point Δ, and the STRAIGHT ΑΒ on ΔΕ, also the point Β will apply[5] to Ε, by the equality of ΑΒ to ΔΕ. Then, ΑΒ applying to ΔΕ, also STRAIGHT ΑΓ will apply to ΔΖ, by the equality of angle ΒΑΓ to ΕΔΖ. Hence the point Γ to the point Ζ will apply, by the equality, again, of ΑΓ to ΔΖ. But Β had applied to Ε; Hence the base ΒΓ to the base ΕΖ will apply. For if, Β applying to Ε, and Γ to Ζ, the base ΒΓ will not apply to ΕΖ, two STRAIGHTs will enclose a space, which is impossible. Therefore will apply base ΒΓ to ΕΖ and will be equal to it. Hence triangle ΑΒΓ as a whole	Ἐφαρμοζομένου γὰρ τοῦ ΑΒΓ τριγώνου ἐπὶ τὸ ΔΕΖ τρίγωνον καὶ τιθεμένου τοῦ μὲν Α σημείου ἐπὶ τὸ Δ σημεῖον τῆς δὲ ΑΒ εὐθείας ἐπὶ τὴν ΔΕ, ἐφαρμόσει καὶ τὸ Β σημεῖον ἐπὶ τὸ Ε διὰ τὸ ἴσην εἶναι τὴν ΑΒ τῇ ΔΕ· ἐφαρμοσάσης δὴ τῆς ΑΒ ἐπὶ τὴν ΔΕ ἐφαρμόσει καὶ ἡ ΑΓ εὐθεῖα ἐπὶ τὴν ΔΖ διὰ τὸ ἴσην εἶναι τὴν ὑπὸ ΒΑΓ γωνίαν τῇ ὑπὸ ΕΔΖ· ὥστε καὶ τὸ Γ σημεῖον ἐπὶ τὸ Ζ σημεῖον ἐφαρμόσει διὰ τὸ ἴσην πάλιν εἶναι τὴν ΑΓ τῇ ΔΖ. ἀλλὰ μὴν καὶ τὸ Β ἐπὶ τὸ Ε ἐφηρμόκει· ὥστε βάσις ἡ ΒΓ ἐπὶ βάσιν τὴν ΕΖ ἐφαρμόσει. εἰ γὰρ τοῦ μὲν Β ἐπὶ τὸ Ε ἐφαρμόσαντος τοῦ δὲ Γ ἐπὶ τὸ Ζ ἡ ΒΓ βάσις ἐπὶ τὴν ΕΖ οὐκ ἐφαρμόσει, δύο εὐθεῖαι χωρίον περιέξουσιν· ὅπερ ἐστὶν ἀδύνατον. ἐφαρμόσει ἄρα ἡ ΒΓ βάσις ἐπὶ τὴν ΕΖ καὶ ἴση αὐτῇ ἔσται· ὥστε καὶ ὅλον τὸ ΑΒΓ τρίγωνον	Çünkü, üstüne koyulursa ΑΒΓ üçgeni ΔΕΖ üçgeninin, ve yerleştirilirse Α noktası Δ noktasına, ve ΑΒ doğrusu ΔΕ doğrusuna, o zaman Β noktası yerleşecek Ε noktasına, ΑΒ doğrusunun ΔΕ doğrusuna eşitliği sayesinde. Böylece, ΑΒ doğrusunu yerleştirilince ΔΕ doğrusuna, ΑΓ doğrusu üstüne gelecek ΔΖ doğrusunun, ΒΑΓ açısının eşitliği sayesinde, ΕΔΖ açısına. Dolayısıyla, Γ noktası yerleşecek Ζ noktasına, eşitliği sayesinde, yine, ΑΓ doğrusunun ΔΖ doğrusuna. Ama Β konuldu Ε noktasına; Dolayısıyla, ΒΓ tabanı üstüne gelecek ΕΖ tabanının. Çünkü eğer, konulunca Β, Ε noktasına, ve Γ, Ζ noktasına, ΒΓ tabanı yerleşmeyecekse ΕΖ tabanına,

[1]More smoothly, 'If two triangles have two sides equal to two sides'.

[2]That is, 'respectively'. We could translate the Greek also as 'each to each'; but the Greek ἑκατέρος has the dual number, as opposed to ἕκαστος 'each'. The English form 'either' is a remnant of the dual number.

[3]It appears that for Euclid, things are never simply *equal;* they are equal *to* something. Here the equal STRAIGHTS containing the angle are not equal to one another; they are separately equal to the two STRAIGHTS in the other triangle.

[4]Here Euclid's καί has a different meaning from the earlier instance; now it shows the transition to the conclusion of the enunciation. In fact the conclusion has the form καί. . . καί. . . καί. . . This general form might be translated as 'Both. . . and. . . and. . . ' The word *both* properly refers to two things, but the Oxford English Dictionary cites an example from Chaucer (1386) where it refers to three things: 'Both heaven and earth and sea'. The word *both* seems to have entered English late, from Old Norse; it supplanted the earlier word*bo*.

to triangle ΔEZ as a whole
will apply
and will be equal to it,
and the remaining angles
to the remaining angles
will apply,
and be equal to them,
ΑΒΓ to ΔEZ
and ΑΓΒ to ΔZE.

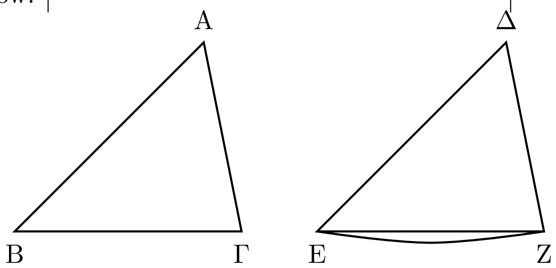
ἐπὶ ὅλον τὸ ΔΕΖ τρίγωνον
ἐφαρμόσει
καὶ ἴσον αὐτῷ ἔσται,
καὶ αἱ λοιπαὶ γωνίαι
ἐπὶ τὰς λοιπὰς γωνίας
ἐφαρμόσουσι
καὶ ἴσαι αὐταῖς ἔσονται,
ἡ μὲν ὑπὸ ΑΒΓ τῇ ὑπὸ ΔΕΖ
ἡ δὲ ὑπὸ ΑΓΒ τῇ ὑπὸ ΔΖΕ.

iki doğru çevreleyecek bir alan,
imkansız olan.
Bu yüzden ΒΓ tabanı çakışacak EZ tabanıyla
ve eşit olacak ona.
Dolayısıyla ΑΒΓ üçgeninin tamamı üstüne gelecek ΔEZ üçgeninin tamamına,
ve eşit olacak ona,
ve geriye kalan açılar üstüne gelecekler geriye kalan açıların,
ve eşit olacaklar onlara;
ΑΒΓ, ΔEZ açısına
ve ΑΓΒ, ΔZE açısına.

If, therefore, two triangles
two sides
to two sides
have equal,
either to either,
and angle to angle have equal,
—that which is by the equal STRAIGHTS
contained,
also base to base
they will have equal,
and the triangle to the triangle
will be equal,
and the remaining angles
to the remaining angles
will be equal,
either to either,
—those that the equal sides subtend;
—just what it was necessary to show.

Ἐὰν ἄρα δύο τρίγωνα
τὰς δύο πλευρὰς
[ταῖς] δύο πλευραῖς
ἴσας ἔχῃ
ἑκατέραν ἑκατέρᾳ
καὶ τὴν γωνίαν τῇ γωνίᾳ ἴσην ἔχῃ
τὴν ὑπὸ τῶν ἴσων εὐθειῶν
περιεχομένην,
καὶ τὴν βάσιν τῇ βάσει
ἴσην ἕξει,
καὶ τὸ τρίγωνον τῷ τριγώνῳ
ἴσον ἔσται,
καὶ αἱ λοιπαὶ γωνίαι
ταῖς λοιπαῖς γωνίαις
ἴσαι ἔσονται
ἑκατέρα ἑκατέρᾳ,
ὑφ᾽ ἃς αἱ ἴσαι πλευραὶ ὑποτείνουσιν·
ὅπερ ἔδει δεῖξαι.

Dolayısıyla, eğer,
iki üçgenin, varsa iki kenarı eşit olan iki kenara,
her bir (kenar) birine,
ve varsa açıya eşit açısı,
(yani) eşit doğrularca içerilen,
hem tabana eşit tabanları olacak,
hem üçgen eşit olacak üçgene,
hem de geriye kalan açılar eşit olacak geriye kalan açıların,
her biri birine,
(yani) eşit kenarları görenler;
—gösterilmesi gereken tam buydu.



1.5

In[1] isosceles triangles,
the angles at the base
are equal to one another,
and,
the equal STRAIGHTS being extended,
the angles under the base
will be equal to one another.

Τῶν ἰσοσκελῶν τριγώνων
αἱ πρὸς τῇ βάσει γωνίαι
ἴσαι ἀλλήλαις εἰσίν,
καὶ
προσεκβληθεισῶν τῶν ἴσων εὐθειῶν
αἱ ὑπὸ τὴν βάσιν γωνίαι
ἴσαι ἀλλήλαις ἔσονται.

İkizkenar üçgenlerde,
tabandaki açılar,
birbirine eşittir,
ve,
eşit doğrular uzatıldığında,
tabanın altında kalan açılar,
birbirine eşit olacaklar.

Let there be
an isosceles triangle, ΑΒΓ
having equal
side AB to side ΑΓ,
and suppose have been extended
on a STRAIGHT with AB and ΑΓ

Ἔστω
τρίγωνον ἰσοσκελὲς τὸ ΑΒΓ
ἴσην ἔχον
τὴν ΑΒ πλευρὰν τῇ ΑΓ πλευρᾷ,
καὶ προσεκβεβλήσθωσαν
ἐπ᾽ εὐθείας ταῖς ΑΒ, ΑΓ

Verilmiş olsun,
bir ΑΒΓ ikizkenar üçgeni;
AB kenarı eşit olan ΑΓ kenarına,
ve varsayılsın ΒΔ ve ΓΕ doğrularının uzatılmış olduğu, AB ve ΑΓ doğrularından.

[5] Heath has *coinciding* here, but the verb is just the active form of what, in the passive, is translated as *being applied*.

[1] More literally, 'of'.

the STRAIGHTS ΒΔ and ΓΕ.

εὐθεῖαι αἱ ΒΔ, ΓΕ·

I say that
angle ΑΒΓ to angle ΑΓΒ
is equal,
and ΓΒΔ to ΒΓΕ.

λέγω, ὅτι
ἡ μὲν ὑπὸ ΑΒΓ γωνία τῇ ὑπὸ ΑΓΒ
ἴση ἐστίν,
ἡ δὲ ὑπὸ ΓΒΔ τῇ ὑπὸ ΒΓΕ.

İddia ediyorum ki
ΑΒΓ açısı, ΑΓΒ açısına,
eşittir
ve ΓΒΔ açısı eşittir ΒΓΕ açısına.

For, suppose there has been chosen
a random point Ζ on ΒΔ,
and there has been taken away
from the greater, ΑΕ,
to the less, ΑΖ,
an equal, ΑΗ,
and suppose there have been joined
the STRAIGHTS ΖΓ and ΗΒ.

Εἰλήφθω γὰρ
ἐπὶ τῆς ΒΔ τυχὸν σημεῖον τὸ Ζ,
καὶ ἀφῃρήσθω
ἀπὸ τῆς μείζονος τῆς ΑΕ
τῇ ἐλάσσονι τῇ ΑΖ
ἴση ἡ ΑΗ,
καὶ ἐπεζεύχθωσαν
αἱ ΖΓ, ΗΒ εὐθεῖαι.

Çünkü, kabul edelim ki, seçilmiş olsun,
rastgele bir Ζ noktası ΒΔ üzerinnde,
ve ΑΗ,
büyük olan ΑΕ doğrusundan
küçük olan ΑΖ doğrusunun kesilmişi olsun,
ve ΖΓ ile ΗΒ birleştirilmiş olsun.

Since then ΑΖ is equal to ΑΗ,
and ΑΒ to ΑΓ,
so the two ΑΖ and ΑΓ
to the two ΗΑ, ΑΒ,
will be equal,
either to either;
and they bound a common angle,
[namely] ΖΑΗ;
therefore the base ΖΓ to the base ΗΒ
is equal,
and triangle ΑΖΓ to triangle ΑΗΒ
will be equal,
and the remaining angles
to the remaining angles
will be equal,
either to either,
those that the equal sides subtend,
ΑΓΖ to ΑΒΗ,
and ΑΖΓ to ΑΗΒ.
And since ΑΖ as a whole
to ΑΗ as a whole
is equal,
of which the [part] ΑΒ to ΑΓ is equal,
therefore the remainder ΒΖ
to the remainder ΓΗ
is equal.
And ΖΓ was shown equal to ΗΒ.
Then the two ΒΖ and ΖΓ
to the two ΓΗ and ΗΒ
are equal,
either to either,
and angle ΒΖΓ
to angle ΓΗΒ
[is] equal,
and the common base of them is ΒΓ;
and therefore triangle ΒΖΓ
to triangle ΓΗΒ
will be equal,
and the remaining angles
to the remaining angles
will be equal,
either to either,
which the equal sides subtend.
Equal therefore is
ΖΒΓ to ΗΓΒ,
and ΒΓΖ to ΓΒΗ.
Since then angle ΑΒΗ as a whole

Ἐπεὶ οὖν ἴση ἐστὶν ἡ μὲν ΑΖ τῇ ΑΗ
ἡ δὲ ΑΒ τῇ ΑΓ,
δύο δὴ αἱ ΖΑ, ΑΓ
δυσὶ ταῖς ΗΑ, ΑΒ
ἴσαι εἰσὶν
ἑκατέρα ἑκατέρᾳ·
καὶ γωνίαν κοινὴν περιέχουσι
τὴν ὑπὸ ΖΑΗ·
βάσις ἄρα ἡ ΖΓ βάσει τῇ ΗΒ
ἴση ἐστίν,
καὶ τὸ ΑΖΓ τρίγωνον τῷ ΑΗΒ τριγώνῳ
ἴσον ἔσται,
καὶ αἱ λοιπαὶ γωνίαι
ταῖς λοιπαῖς γωνίαις
ἴσαι ἔσονται
ἑκατέρα ἑκατέρᾳ,
ὑφ᾽ ἃς αἱ ἴσαι πλευραὶ ὑποτείνουσιν,
ἡ μὲν ὑπὸ ΑΓΖ τῇ ὑπὸ ΑΒΗ,
ἡ δὲ ὑπὸ ΑΖΓ τῇ ὑπὸ ΑΗΒ.
καὶ ἐπεὶ ὅλη ἡ ΑΖ
ὅλῃ τῇ ΑΗ
ἐστιν ἴση,
ὧν ἡ ΑΒ τῇ ΑΓ ἐστιν ἴση,
λοιπὴ ἄρα ἡ ΒΖ
λοιπῇ τῇ ΓΗ
ἐστιν ἴση.
ἐδείχθη δὲ καὶ ἡ ΖΓ τῇ ΗΒ ἴση·
δύο δὴ αἱ ΒΖ, ΖΓ
δυσὶ ταῖς ΓΗ, ΗΒ
ἴσαι εἰσὶν
ἑκατέρα ἑκατέρᾳ·
καὶ γωνία ἡ ὑπὸ ΒΖΓ
γωνίᾳ τῃ ὑπὸ ΓΗΒ
ἴση,
καὶ βάσις αὐτῶν κοινὴ ἡ ΒΓ·
καὶ τὸ ΒΖΓ ἄρα τρίγωνον
τῷ ΓΗΒ τριγώνῳ
ἴσον ἔσται,
καὶ αἱ λοιπαὶ γωνίαι
ταῖς λοιπαῖς γωνίαις
ἴσαι ἔσονται
ἑκατέρα ἑκατέρᾳ,
ὑφ᾽ ἃς αἱ ἴσαι πλευραὶ ὑποτείνουσιν·
ἴση ἄρα ἐστὶν
ἡ μὲν ὑπὸ ΖΒΓ τῇ ὑπὸ ΗΓΒ
ἡ δὲ ὑπὸ ΒΓΖ τῇ ὑπὸ ΓΒΗ.
ἐπεὶ οὖν ὅλη ἡ ὑπὸ ΑΒΗ γωνία

Çünkü o zaman ΑΖ eşittir ΑΗ doğrusuna,
ve ΑΒ doğrusu ΑΓ doğrusuna,
böylece ΑΖ ve ΑΓ ikilisi eşit olacak ΗΑ ve ΑΒ ikilisinin,
her biri birine;
ve sınırlandırırlar ortak bir açıyı, (yani) ΖΑΗ açısını;
dolayısıyla ΖΓ tabanı eşittir ΗΒ tabanına,
ve ΑΖΓ üçgeni eşit olacak ΑΗΒ üçgenine,
ve geriye kalan açılar eşit olacaklar geriye kalan açıların,
her biri birine,
(yani) eşit kenarları görenler;
ΑΓΖ açısı ΑΒΗ açısına,
ve ΑΖΓ açısı ΑΗΒ açısına.
Böylece ΑΖ bütününün eşitliği ΑΗ bütününe,
ve bunların ΑΒ parçasının eşitliği ΑΓ parçasına,
gerektirir ΒΖ kalanının eşit olmasını ΓΗ kalanına.
Ve ΖΓ doğrusunun gösterilmişti eşit olduğu ΗΒ doğrusuna.
O zaman ΒΖ ve ΖΓ ikilisi eşittir ΓΗve ΗΒ ikilisinin,
her biri birine,
ve ΒΖΓ açısı ΓΗΒ açısına,
ve onların ortak tabanı ΒΓ doğrusudur;
ve bu yüzden ΒΖΓ üçgeni eşit olacak ΓΗΒ üçgenine,
ve geriye kalan açılar da eşit olacaklar geriye kalan açıların,
her biri birine,
aynı kenarları görenler.
Dolayısıyla ΖΒΓ eşittir ΗΓΒ açısına,
ve ΒΓΖ açısı ΓΒΗ açısına.
Çünkü gösterilmiş oldu ΑΒΗ açısının bütününün eşit olduğu ΑΓΖ açısının bütününe,
ve bunların ΓΒΗ parçasının (eşitliği) ΒΓΖ parçasına,
dolayısıyla ΑΒΓ kalanı eşittir ΑΓΒ kalanına;

to angle ΑΓΖ as a whole
was shown equal,
of which the [part] ΓΒΗ to ΒΓΖ
is equal,
therefore the remainder ΑΒΓ
to the remainder ΑΓΒ
is equal;
and they are at the base
of the triangle ΑΒΓ.
And was shown also
ΖΒΓ equal to ΗΓΒ;
and they are under the base.

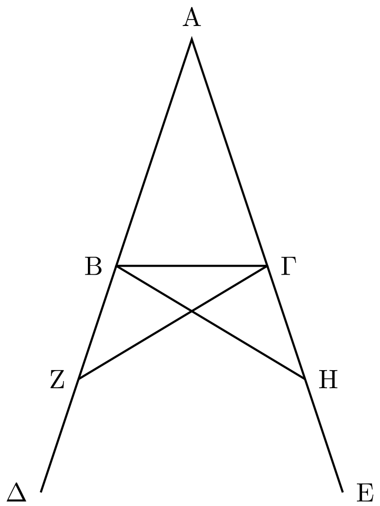
ὅλη τῇ ὑπὸ ΑΓΖ γωνίᾳ
ἐδείχθη ἴση,
ὧν ἡ ὑπὸ ΓΒΗ τῇ ὑπὸ ΒΓΖ
ἴση,
λοιπὴ ἄρα ἡ ὑπὸ ΑΒΓ
λοιπῇ τῇ ὑπὸ ΑΓΒ
ἐστιν ἴση·
καί εἰσι πρὸς τῇ βάσει
τοῦ ΑΒΓ τριγώνου.
ἐδείχθη δὲ καὶ
ἡ ὑπὸ ΖΒΓ τῇ ὑπὸ ΗΓΒ ἴση·
καί εἰσιν ὑπὸ τὴν βάσιν.

ve bunlar ΑΒΓ üçgeninin tabanıdır.
Ve ΖΒΓ açısının eşit olduğu gösterilmişti ΗΓΒ açısına;
ve bunlar tabanın altındadır.

Therefore, in isosceles triangles,
the angles at the base
are equal to one another,
and,
the equal STRAIGHTs being extended,
the angles under the base
will be equal to one another;
—just what it was necessary to show.

Τῶν ἰσοσκελῶν τριγώνων
αἱ πρὸς τῇ βάσει γωνίαι
ἴσαι ἀλλήλαις εἰσίν,
καὶ
προσεκβληθεισῶν τῶν ἴσων εὐθειῶν
αἱ ὑπὸ τὴν βάσιν γωνίαι
ἴσαι ἀλλήλαις ἔσονται·
ὅπερ ἔδει δεῖξαι.

Dolayısıyla bir ikizkenar üçgenin tabanındaki açılar birbirine eşittir,
ve, eşit doğrular uzatıldığında,
tabanın altında kalan açılar birbirine eşit olacaklar;
—gösterilmesi gereken tam buydu.



1.6

If in a triangle
two angles be equal to one another,
also the sides that subtend the equal angles
will be equal to one another.

Ἐὰν τριγώνου
αἱ δύο γωνίαι ἴσαι ἀλλήλαις ὦσιν,
καὶ αἱ ὑπὸ τὰς ἴσας γωνίας ὑποτείνουσαι πλευραὶ
ἴσαι ἀλλήλαις ἔσονται.

Eğer bir üçgende
birbirine eşit iki açı varsa,
eşit açıların gördüğü kenarlar da
birbirine eşit olacaklar.

Let there be
a triangle, ΑΒΓ,
having equal
angle ΑΒΓ
to angle ΑΓΒ.

Ἔστω
τρίγωνον τὸ ΑΒΓ
ἴσην ἔχον
τὴν ὑπὸ ΑΒΓ γωνίαν
τῇ ὑπὸ ΑΓΒ γωνίᾳ·

Verilmiş olsun,
bir ΑΒΓ üçgeni,
ΑΒΓ açısı eşit olan
ΑΓΒ açısına.

I say that
also side ΑΒ to side ΑΓ
is equal.

λέγω, ὅτι
καὶ πλευρὰ ἡ ΑΒ πλευρᾷ τῇ ΑΓ
ἐστιν ἴση.

İddia ediyorum ki
ΑΒ kenarı da ΑΓ kenarına
eşittir.

For if unequal is ΑΒ to ΑΓ,
one of them is greater.
Suppose ΑΒ be greater,
and there has been taken away

Εἰ γὰρ ἄνισός ἐστιν ἡ ΑΒ τῇ ΑΓ,
ἡ ἑτέρα αὐτῶν μείζων ἐστίν.
ἔστω μείζων ἡ ΑΒ,
καὶ ἀφῃρήσθω

Çünkü eğer ΑΒ eşit değil ise ΑΓ kenarına,
biri daha büyüktür.
ΑΒ daha büyük olan olsun,

from the greater, AB,
to the less, ΑΓ,
an equal, ΔΒ,
and there has been joined ΔΓ.

ἀπὸ τῆς μείζονος τῆς ΑΒ
τῇ ἐλάττονι τῇ ΑΓ
ἴση ἡ ΔΒ,
καὶ ἐπεζεύχθω ἡ ΔΓ.

ve diyelim, daha küçük olan ΑΓ kenarına eşit olan, ΔΒ,
daha büyük olan, AB kenarından kesilmiş olsun,
ve ΔΓ birleştirilmiş olsun.

Since then ΔΒ is equal to ΑΓ,
and ΒΓ is common,
so the two ΔΒ and ΒΓ
to the two ΑΓ and ΒΓ
are equal,
either to either,
and angle ΔΒΓ
to angle ΑΓΒ
is equal;
therefore the base ΔΓ to the base AB
is equal,
and triangle ΔΒΓ to triangle ΑΓΒ
will be equal,
the less to the greater;
which is absurd.
therefore AB is not unequal to ΑΓ;
therefore it is equal.

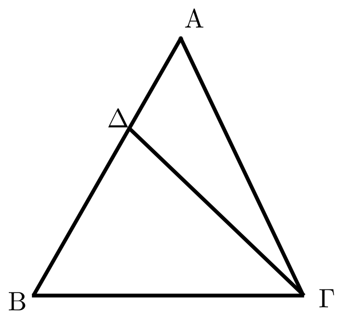
Ἐπεὶ οὖν ἴση ἐστὶν ἡ ΔΒ τῇ ΑΓ
κοινὴ δὲ ἡ ΒΓ,
δύο δὴ αἱ ΔΒ, ΒΓ
δύο ταῖς ΑΓ, ΓΒ
ἴσαι εἰσὶν
ἑκατέρα ἑκατέρᾳ,
καὶ γωνία ἡ ὑπὸ ΔΒΓ
γωνίᾳ τῇ ὑπὸ ΑΓΒ
ἐστιν ἴση·
βάσις ἄρα ἡ ΔΓ βάσει τῇ ΑΒ
ἴση ἐστίν,
καὶ τὸ ΔΒΓ τρίγωνον τῷ ΑΓΒ τριγώνῳ
ἴσον ἔσται,
τὸ ἔλασσον τῷ μείζονι·
ὅπερ ἄτοπον·
οὐκ ἄρα ἄνισός ἐστιν ἡ ΑΒ τῇ ΑΓ·
ἴση ἄρα.

O zaman ΔΒ eşittir ΑΓ kenarına,
ve ΒΓ ortaktır,
böylece ΔΒ, ΒΓ ikilisi eşittirler ΑΓ, ΒΓ ikilisinin,
her biri birine,
ve ΔΒΓ açısı eşittir ΑΓΒ açısına;
dolayısıyla ΔΓ tabanı eşittir AB tabanına,
ve ΔΒΓ üçgeni eşit olacak ΑΓΒ üçgenine,
daha küçük daha büyüğe;
ki bu saçmadır.
dolayısıyla AB değildir eşit değil ΑΓ kenarına;
dolayısıyla eşittir.

If therefore in a triangle
two angles be equal to one another,
also the sides that subtend the equal angles
will be equal to one another;
—just what it was necessary to show.

Ἐὰν τριγώνου
αἱ δύο γωνίαι ἴσαι ἀλλήλαις ὦσιν,
καὶ αἱ ὑπὸ τὰς ἴσας γωνίας ὑποτείνουσαι πλευραὶ
ἴσαι ἀλλήλαις ἔσονται·
ὅπερ ἔδει δεῖξαι.

Dolayısıyla eğer bir üçgenin birbirine eşit iki açısı varsa,
eşit açıların gördüğü kenarlar eşittir;
—gösterilmesi gereken tam buydu.



1.7

On the same STRAIGHT,
to the same two STRAIGHTs,
two other STRAIGHTs,
[which are] equal,
either to either,
will not be constructed
to one and another point,[1]
to the same parts,[2]
having the same extremities
as[3] the original lines.

Ἐπὶ τῆς αὐτῆς εὐθείας
δύο ταῖς αὐταῖς εὐθείαις
ἄλλαι δύο εὐθεῖαι
ἴσαι
ἑκατέρα ἑκατέρᾳ
οὐ συσταθήσονται
πρὸς ἄλλῳ καὶ ἄλλῳ σημείῳ
ἐπὶ τὰ αὐτὰ μέρη
τὰ αὐτὰ πέρατα ἔχουσαι
ταῖς ἐξ ἀρχῆς εὐθείαις.

Aynı doğru üzerinde,
verilmiş iki doğruya,
eşit iki başka doğru,
her biri birine,
inşa edilmeyecek
bir ve başka bir noktaya,
aynı tarafta,
aynı uçları olan
başlangıçtaki doğrularla.

For if possible,
on the same STRAIGHT AB

Εἰ γὰρ δυνατόν,
ἐπὶ τῆς αὐτῆς εὐθείας τῆς ΑΒ

Çünkü eğer mümkünse,
aynı AB doğrusunda

[1] Literally 'another and another point'; more clearly in English, 'to different points'.

[2] In English as apparently in Greek, *parts* can mean 'region'—in this case, more precisely, 'side'.

[3] According to Fowler ([5, **as 8,** p. 34] and [4, **as 9,** p. 38]), '*As* is never to be regarded as a preposition'. This is unfortunate, since it means that the two constructions 'Equal to X' and 'Same as X' are not grammatically parallel. (We have 'equal to him', but 'same as he'.) The constructions are parallel in Greek: ἴσος + DATIVE and αὐτός + DATIVE.

to two given STRAIGHTs ΑΓ, ΓΒ,
two other STRAIGHTs ΑΔ, ΔΒ,
equal
either to either
suppose have been constructed[4]
to one and another point
Γ and Δ,
to the same parts,
having the same extremities,
so that ΓΑ is[5] equal to ΔΑ,
having the same extremity as it, Α,
and ΓΒ to ΔΒ,
having the same extremity as it, Β,
and suppose there has been joined
ΓΔ.

δύο ταῖς αὐταῖς εὐθείαις ταῖς ΑΓ, ΓΒ
ἄλλαι δύο εὐθεῖαι αἱ ΑΔ, ΔΒ
ἴσαι
ἑκατέρα ἑκατέρᾳ
συνεστάτωσαν
πρὸς ἄλλῳ καὶ ἄλλῳ σημείῳ
τῷ τε Γ καὶ Δ
ἐπὶ τὰ αὐτὰ μέρη
τὰ αὐτὰ πέρατα ἔχουσαι,
ὥστε ἴσην εἶναι τὴν μὲν ΓΑ τῇ ΔΑ
τὸ αὐτὸ πέρας ἔχουσαν αὐτῇ τὸ Α,
τὴν δὲ ΓΒ τῇ ΔΒ
τὸ αὐτὸ πέρας ἔχουσαν αὐτῇ τὸ Β,
καὶ ἐπεζεύχθω
ἡ ΓΔ.

verilmiş iki ΑΓ, ΓΒ doğrusuna
eşit başka iki ΑΔ, ΔΒ doğrusu
her biri birine
—diyelim inşa edilmiş olsunlar
bir ve başka bir noktaya
Γ ve Δ,
aynı tarafta,
aynı uçları olan,
şöyle ki ΓΑ eşit olmalı ΔΑ doğrusuna,
aynı Α ucuna sahip olan,
ve ΓΒ, ΔΒ doğrusuna,
aynı Β ucuna sahip olan,
ve ΓΔ birleştirilmiş olsun.

Because equal is ΑΓ to ΑΔ,
equal is
also angle ΑΓΔ to ΑΔΓ;
Greater therefore [is]
ΑΔΓ than[6] ΔΓΒ;[7]
by much, therefore, [is]
ΓΔΒ greater than ΔΓΒ.
Moreover, since equal is ΓΒ to ΔΒ,
equal is also
angle ΓΔΒ to angle ΔΓΒ.
But it was also shown than it
much greater;
which is absurd.

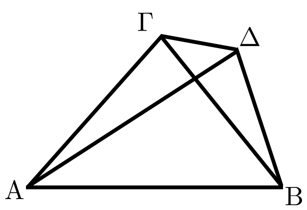
Ἐπεὶ οὖν ἴση ἐστὶν ἡ ΑΓ τῇ ΑΔ,
ἴση ἐστὶ
καὶ γωνία ἡ ὑπὸ ΑΓΔ τῇ ὑπὸ ΑΔΓ·
μείζων ἄρα
ἡ ὑπὸ ΑΔΓ τῆς ὑπὸ ΔΓΒ·
πολλῷ ἄρα
ἡ ὑπὸ ΓΔΒ μείζων ἐστί τῆς ὑπὸ ΔΓΒ.
πάλιν ἐπεὶ ἴση ἐστὶν ἡ ΓΒ τῇ ΔΒ,
ἴση ἐστὶ καὶ
γωνία ἡ ὑπὸ ΓΔΒ γωνίᾳ τῇ ὑπὸ ΔΓΒ.
ἐδείχθη δὲ αὐτῆς καὶ
πολλῷ μείζων·
ὅπερ ἐστὶν ἀδύνατον.

Çünkü ΑΓ eşittir ΑΔ doğrusuna,
yine eşittir
ΑΓΔ, ΑΔΓ açısına;
dolayısıyla ΑΔΓ büyüktür ΔΓΒ açısından;
dolayısıyla ΓΔΒ çok daha büyüktür ΔΓΒ açısından.
Üstelik ΓΒ eşit olduğu için ΔΒ doğrusuna,
ΓΔΒ açısı eşittir ΔΓΒ açısına.
Ama ondan çok daha büyük olduğu gösterilmişti;
ki bu saçmadır.

Not, therefore,
on the same STRAIGHT,
to the same two STRAIGHTs,
two other STRAIGHTs
[which are] equal,
either to either,
will be constructed
to one and another point
to the same parts
having the same extremities
as the original lines;
—just what it was necessary to show.

Οὐκ ἄρα
ἐπὶ τῆς αὐτῆς εὐθείας
δύο ταῖς αὐταῖς εὐθείαις
ἄλλαι δύο εὐθεῖαι
ἴσαι
ἑκατέρα ἑκατέρᾳ
συσταθήσονται
πρὸς ἄλλῳ καὶ ἄλλῳ σημείῳ
ἐπὶ τὰ αὐτὰ μέρη
τὰ αὐτὰ πέρατα ἔχουσαι
ταῖς ἐξ ἀρχῆς εὐθείαις·
ὅπερ ἔδει δεῖξαι.

Şöyle olmaz, dolayısıyla; aynı doğru üzerinde,
verilmiş iki doğruya,
iki başka doğru, eşit,
her biri birine,
inşa edilecek
başka bir noktaya
aynı tarafta
aynı uçları olan
başlangıçtaki doğrularla.
—gösterilmesi gereken tam buydu.



[4]The Perseus Project Word Study Tool does not recognize συνεστάτωσαν here, but it should be just the plural form of συνεστάτω, which is used for example in Proposition I.2 and which Perseus declares to be a passive perfect imperative. The active third-person imperative ending -τωσαν (instead of the older -ντων) is said by Smyth [16, 466] to appear in prose after Thucydides. This describes Euclid. However, I cannot explain from Smyth the use of an active *perfect* (as opposed to aorist) form with passive meaning. Presumably the verb is used 'impersonally'. The LSJ lexicon [10] cites the present proposition under συνίστημι. See also the note at I.21.

[5]The Greek verb is an infinitive. An infinitive clause may follow ὥστε [16, ¶2260, p. 507]. Compare the enunciation of Proposition 1.

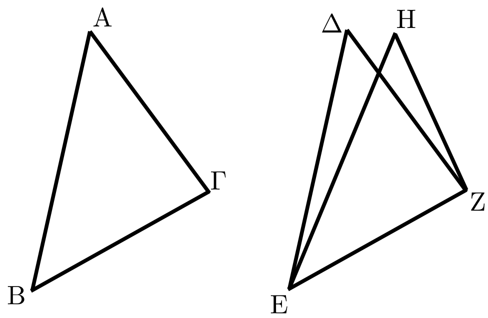
[6]Fowler ([5, **than 6,** p. 629] and [4, **than 6,** p. 619]) does grant the possibility of construing 'than' as a preposition, though he disapproves. Then English cannot exactly mirror the Greek μείζων + GENITIVE. Turkish does mirror it with *-den büyük*. See note 3 above.

[7]Here one must refer to the diagram.

1.8

If two triangles two sides to two sides have equal, either to either, and have also base equal to base, also angle to angle they will have equal, [namely] that by the equal STRAIGHTS subtended.	Ἐὰν δύο τρίγωνα τὰς δύο πλευρὰς [ταῖς] δύο πλευραῖς ἴσας ἔχῃ ἑκατέραν ἑκατέρᾳ, ἔχῃ δὲ καὶ τὴν βάσιν τῇ βάσει ἴσην, καὶ τὴν γωνίαν τῇ γωνίᾳ ἴσην ἕξει τὴν ὑπὸ τῶν ἴσων εὐθειῶν περιεχομένην.	Eğer iki üçgenin, varsa iki kenarı eşit olan iki kenara, her bir (kenar) birine, ve varsa tabana eşit tabanı, ayrıca olacak açıya eşit açıları, (yani) eşit kenarları görenler.
Let there be two triangles, ΑΒΓ and ΔΕΖ, the two sides ΑΒ and ΑΓ to the two sides ΔΕ and ΔΖ having equal, either to either, ΑΒ to ΔΕ, and ΑΓ to ΔΖ; and let them have base ΒΓ equal to base ΕΖ.	Ἔστω δύο τρίγωνα τὰ ΑΒΓ, ΔΕΖ τὰς δύο πλευρὰς τὰς ΑΒ, ΑΓ ταῖς δύο πλευραῖς ταῖς ΔΕ, ΔΖ ἴσας ἔχοντα ἑκατέραν ἑκατέρᾳ, τὴν μὲν ΑΒ τῇ ΔΕ τὴν δὲ ΑΓ τῇ ΔΖ· ἐχέτω δὲ καὶ βάσιν τὴν ΒΓ βάσει τῇ ΕΖ ἴσην·	Verilmiş olsun iki üçgen, ΑΒΓ ve ΔΕΖ, iki kenarı ΑΒ, ΑΓ eşit olan ΔΕ, ΔΖ iki kenarının her biri birine, ΑΒ, ΔΕ kenarına, ve ΑΓ, ΔΖ kenarına; ve onların ΒΓ tabanı eşit olsun ΕΖ tabanına.
I say that also angle ΒΑΓ to angle ΕΔΖ is equal.	λέγω, ὅτι καὶ γωνία ἡ ὑπὸ ΒΑΓ γωνίᾳ τῇ ὑπὸ ΕΔΖ ἐστιν ἴση.	İddia ediyorum ki ΒΑΓ açısı da eşittir ΕΔΖ açısına.
For, there being applied triangle ΑΒΓ to triangle ΔΕΖ, and there being placed the point Β on the point Ε, and the STRAIGHT ΒΓ on ΕΖ, also the point Γ will apply to Ζ, by the equality of ΒΓ to ΕΖ. Then, ΒΓ applying to ΕΖ, also will apply ΒΑ and ΓΑ to ΕΔ and ΔΖ. For if base ΒΓ to the base ΕΖ apply, and sides ΒΑ, ΑΓ to ΕΔ, ΔΖ do not apply, but deviate, as ΕΗ, ΗΖ, there will be constructed on the same STRAIGHT, to two given STRAIGHTs, two other STRAIGHTs equal, either to either, to one and another point to the same parts having the same extremities. But they are not constructed; therefore it is not [the case] that, there being applied the base ΒΓ to the base ΕΖ, there do not apply sides ΒΑ, ΑΓ to ΕΔ, ΔΖ. Therefore they apply. So angle ΒΑΓ	Ἐφαρμοζομένου γὰρ τοῦ ΑΒΓ τριγώνου ἐπὶ τὸ ΔΕΖ τρίγωνον καὶ τιθεμένου τοῦ μὲν Β σημείου ἐπὶ τὸ Ε σημεῖον τῆς δὲ ΒΓ εὐθείας ἐπὶ τὴν ΕΖ ἐφαρμόσει καὶ τὸ Γ σημεῖον ἐπὶ τὸ Ζ διὰ τὸ ἴσην εἶναι τὴν ΒΓ τῇ ΕΖ· ἐφαρμοσάσης δὴ τῆς ΒΓ ἐπὶ τὴν ΕΖ ἐφαρμόσουσι καὶ αἱ ΒΑ, ΓΑ ἐπὶ τὰς ΕΔ, ΔΖ. εἰ γὰρ βάσις μὲν ἡ ΒΓ ἐπὶ βάσιν τὴν ΕΖ ἐφαρμόσει, αἱ δὲ ΒΑ, ΑΓ πλευραὶ ἐπὶ τὰς ΕΔ, ΔΖ οὐκ ἐφαρμόσουσιν ἀλλὰ παραλλάξουσιν ὡς αἱ ΕΗ, ΗΖ, συσταθήσονται ἐπὶ τῆς αὐτῆς εὐθείας δύο ταῖς αὐταῖς εὐθείαις ἄλλαι δύο εὐθεῖαι ἴσαι ἑκατέρα ἑκατέρᾳ πρὸς ἄλλῳ καὶ ἄλλῳ σημείῳ ἐπὶ τὰ αὐτὰ μέρη τὰ αὐτὰ πέρατα ἔχουσαι. οὐ συνίστανται δέ· οὐκ ἄρα ἐφαρμοζομένης τῆς ΒΓ βάσεως ἐπὶ τὴν ΕΖ βάσιν οὐκ ἐφαρμόσουσι καὶ αἱ ΒΑ, ΑΓ πλευραὶ ἐπὶ τὰς ΕΔ, ΔΖ. ἐφαρμόσουσιν ἄρα· ὥστε καὶ γωνία ἡ ὑπὸ ΒΑΓ	Çünkü, üstüne koyulursa ΑΒΓ üçgeni ΔΕΖ üçgeninin, ve yerleştirilirse Β noktası Ε noktasına, ve ΒΓ, ΕΖ doğrusuna, Γ noktası da yerleşecek Ζ noktasına, sayesinde eşitliğinin ΒΓ doğrusunun ΕΖ doğrusuna. O zaman, ΒΓ yerleştirilince ΕΖ doğrusuna, ΒΑ ve ΓΑ doğruları da yerleşecekler ΕΔ ve ΔΖ doğrularına. Çünkü eğer ΒΓ yerleşirse ΕΖ tabanına, ve ΒΑ, ΑΓ kenarları yerleşmezse ΕΔ, ΔΖ kenarlarına, ama saparsa, ΕΗ ve ΗΖ olarak inşa edilmiş olacak aynı doğru üzerinde, verilmiş iki doğruya, iki başka doğru eşit, her biri birine, başka bir noktaya aynı tarafta aynı uçları olan. Ama inşa edilmediler; dolayısıyla (durum) şöyle değil;, ΒΓ tabanı yerleştirilince ΕΖ tabanına, ΒΑ, ΑΓ kenarları yerleşmez ΕΔ, ΔΖ kenarlarına. Dolayısıyla yerleşirler. Böylece ΒΑΓ açısı yerleşecek ΕΔΖ

to angle EΔZ	ἐπὶ γωνίαν τὴν ὑπὸ EΔZ	açısına
will apply	ἐφαρμόσει	ve ona eşit olacak.
and will be equal to it.	καὶ ἴση αὐτῇ ἔσται.	
If, therefore, two triangles	Ἐὰν δύο τρίγωνα	Eğer, dolayısıyla, iki üçgenin,
two sides	τὰς δύο πλευρὰς	varsa iki kenarı
to two sides	[ταῖς] δύο πλευραῖς	eşit olan
have equal,	ἴσας ἔχῃ	iki kenara,
either to either,	ἑκατέραν ἑκατέρᾳ,	her bir (kenar) birine,
and have also base equal to base,	ἔχῃ δὲ καὶ τὴν βάσιν τῇ βάσει ἴσην,	ve varsa tabana eşit tabanı,
also angle to angle	καὶ τὴν γωνίαν τῇ γωνίᾳ	ayrıca olacak açıya eşit açıları,
they will have equal,	ἴσην ἕξει	(yani) eşit kenarları görenler;
[namely] that by the equal STRAIGHTs	τὴν ὑπὸ τῶν ἴσων εὐθειῶν	—gösterilmesi gereken tam buydu.
subtended;	περιεχομένην·	
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	



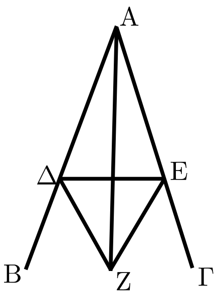
1.9

The[1] given rectilineal angle	Τὴν δοθεῖσαν γωνίαν εὐθύγραμμον	Verilen düzkenar açıyı
to cut in two.[2]	δίχα τεμεῖν.	ikiye kesmek.
Let be	Ἔστω	Verilmiş olsun
the given rectilineal angle	ἡ δοθεῖσα γωνία εὐθύγραμμος	düzkenar bir açı, BAΓ.
BAΓ.	ἡ ὑπὸ BAΓ.	
Then it is necessary	δεῖ δὴ	Şimdi gereklidir
to cut it in two.	αὐτὴν δίχα τεμεῖν.	onun ikiye kesilmesi.
Suppose there has been chosen	Εἰλήφθω	Diyelim seçilmiş olsun
on AB at random a point Δ,	ἐπὶ τῆς AB τυχὸν σημεῖον τὸ Δ,	AB üzerinde rastgele bir nokta, Δ,
and there has been taken from AΓ	καὶ ἀφῃρήσθω ἀπὸ τῆς AΓ	ve kesilmiş olsun AΓ doğrusundan
AE, equal to AΔ,	τῇ AΔ ἴση ἡ AE,	AE, eşit olan AΔ doğrusuna,
and ΔE has been joined,	καὶ ἐπεζεύχθω ἡ ΔE,	ve ΔE birleştirilmiş olsun,
and there has been constructed on ΔE	καὶ συνεστάτω ἐπὶ τῆς ΔE	ve inşa edilmiş olsun ΔE üzerinde
an equilateral triangle, ΔEZ,	τρίγωνον ἰσόπλευρον τὸ ΔEZ,	bir eşkenar üçgen, ΔEZ,
and AZ has been joined.	καὶ ἐπεζεύχθω ἡ AZ·	ve AZ birleştirilmiş olsun.
I say that	λέγω, ὅτι	İddia ediyorum ki
angle BAΓ has been cut in two	ἡ ὑπὸ BAΓ γωνία δίχα τέτμηται	BAΓ açısı ikiye kesilmiş oldu
by the STRAIGHT AZ.	ὑπὸ τῆς AZ εὐθείας.	AZ doğrusu tarafından.
For, because AΔ is equal to AE,	Ἐπεὶ γὰρ ἴση ἐστὶν ἡ AΔ τῇ AE,	Çünkü, olduğundan, AΔ eşit AE kenarına,
and AZ is common,	κοινὴ δὲ ἡ AZ,	ve AZ ortak,
then the two, ΔA and AZ	δύο δὴ αἱ ΔA, AZ	ΔA, AZ ikilisi eşittirler EA, AZ ikilisinin
to the two, EA and AZ,	δυσὶ ταῖς EA, AZ	
are equal,	ἴσαι εἰσὶν	

[1]Here the generic article (see note 1 to Proposition 1 above) is particularly appropriate. Suppose we take a straight line with a point A on it and draw a circle with center A cutting the line at B and C. Then the straight line BC has been bisected at A. In particular, *a* line has been bisected. But this does not mean we have solved the problem of the present proposition. In modern mathematical English, the proposition could indeed be 'To bisect a rectilineal angle'; but then 'a' must be understood as 'an arbitrary' or 'a given'. Of course, Euclid does supply this qualification in any case.

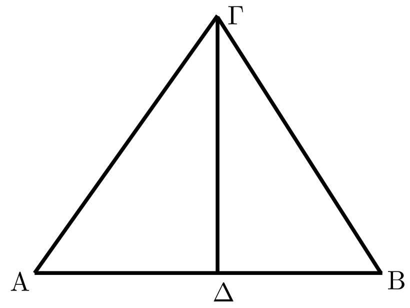
[2]For 'cut in two' we could say 'bisect'; but in at least one place, in Proposition 12, δίχα τεμεῖν will be separated.

either to either, and the base ΔZ to the base EZ is equal; therefore angle ΔAZ to angle EAZ is equal.	ἑκατέρα ἑκατέρᾳ. καὶ βάσις ἡ ΔZ βάσει τῇ EZ ἴση ἐστίν· γωνία ἄρα ἡ ὑπὸ ΔAZ γωνίᾳ τῇ ὑπὸ EAZ ἴση ἐστίν.	her biri birine , ve ΔZ tabanı EZ tabanına eşittir; dolayısıyla ΔAZ açısı EAZ açısına eşittir.
Therefore the given rectilineal angle BAΓ has been cut in two by the STRAIGHT AZ; —just what it was necessary to do.	Ἡ ἄρα δοθεῖσα γωνία εὐθύγραμμος ἡ ὑπὸ BAΓ δίχα τέτμηται ὑπὸ τῆς AZ εὐθείας· ὅπερ ἔδει ποιῆσαι.	Dolayısıyla verilen düzkenar açı BAΓ kesilmiş oldu ikiye AZ doğrusunca; —yapılması gereken tam buydu.



1.10

The given bounded STRAIGHT to cut in two.	Τὴν δοθεῖσαν εὐθεῖαν πεπερασμένην δίχα τεμεῖν.	Verilen sınırlı doğruyu ikiye kesmek.
Let be the given bounded straight line AB.	Ἔστω ἡ δοθεῖσα εὐθεῖα πεπερασμένη ἡ AB·	Verilmiş olsun bir sınırlı doğru, AB.
It is necessary then the bounded straight line AB to cut in two.	δεῖ δὴ τὴν AB εὐθεῖαν πεπερασμένην δίχα τεμεῖν.	Gereklidir, verilmiş AB sınırlı doğrusunu, kesmek ikiye.
Suppose there has been constructed on it an equilateral triangle, ABΓ, and suppose has been cut in two the angle AΓB by the STRAIGHT ΓΔ.	Συνεστάτω ἐπ᾽ αὐτῆς τρίγωνον ἰσόπλευρον τὸ ABΓ, καὶ τετμήσθω ἡ ὑπὸ AΓB γωνία δίχα τῇ ΓΔ εὐθείᾳ·	Kabul edelim ki üzerinde inşa edilmiş olsun bir eşkenar üçgen, ABΓ, ve AΓB açısı kesilmiş olsun ikiye ΓΔ doğrusunca.
I say that the STRAIGHT AB has been cut in two at the point Δ. For, because AΓ is equal to AB, and ΓΔ is common, the two, AΓ and ΓΔ, to the two, BΓ, ΓΔ, are equal, either to either, and angle AΓΔ to angle BΓΔ is equal; therefore the base AΔ to the base BΔ is equal.	λέγω, ὅτι ἡ AB εὐθεῖα δίχα τέτμηται κατὰ τὸ Δ σημεῖον. Ἐπεὶ γὰρ ἴση ἐστὶν ἡ AΓ τῇ ΓB, κοινὴ δὲ ἡ ΓΔ, δύο δὴ αἱ AΓ, ΓΔ δύο ταῖς BΓ, ΓΔ ἴσαι εἰσὶν ἑκατέρα ἑκατέρᾳ· καὶ γωνία ἡ ὑπὸ AΓΔ γωνίᾳ τῇ ὑπὸ BΓΔ ἴση ἐστίν· βάσις ἄρα ἡ AΔ βάσει τῇ BΔ ἴση ἐστίν.	İddia ediyorum ki AB doğrusu ikiye kesilmiş oldu Δ noktasında. Çünkü, AΓ eşit olduğundan AB kenarına, ve ΓΔ ortak, AΓ ve ΓΔ ikilisi, eşittirler BΓ, ΓΔ ikilisinin, her biri birine, ve AΓΔ açısı eşittir BΓΔ açısına; dolayısıyla AΔ tabanı, BΔ tabanına, eşittir.
Therefore the given bounded STRAIGHT, AB, has been cut in two at Δ; —just what it was necessary to do.	Ἡ ἄρα δοθεῖσα εὐθεῖα πεπερασμένη ἡ AB δίχα τέτμηται κατὰ τὸ Δ· ὅπερ ἔδει ποιῆσαι.	Dolayısıyla verilmiş sınırlı AB doğrusu Δ noktasında ikiye kesilmiş oldu; —yapılması gereken tam buydu.



1.11

To the given STRAIGHT from the given point on it at right angles to draw[1] a straight line.[2]	Τῇ δοθείσῃ εὐθείᾳ ἀπὸ τοῦ πρὸς αὐτῇ δοθέντος σημείου πρὸς ὀρθὰς γωνίας εὐθεῖαν γραμμὴν ἀγαγεῖν.	Verilen bir doğruya üzerinde verilen bir noktada dik açılarda bir doğru çizmek.
Let be the given STRAIGHT AB, and the given point on it, Γ.	Ἔστω ἡ μὲν δοθεῖσα εὐθεῖα ἡ ΑΒ τὸ δὲ δοθὲν σημεῖον ἐπ᾽ αὐτῆς τὸ Γ·	Verilmiş olsun bir doğru, AB, ve üzerinde bir nokta, Γ.
It is necessary then from the point Γ to the STRAIGHT AB at right angles to draw a straight line.	δεῖ δὴ ἀπὸ τοῦ Γ σημείου τῇ ΑΒ εὐθείᾳ πρὸς ὀρθὰς γωνίας εὐθεῖαν γραμμὴν ἀγαγεῖν.	Gereklidir Γ noktasında AB doğrusuna dik açılarda bir doğru.
Suppose there has been chosen on AΓ at random a point Δ, and there has been laid down an equal to ΓΔ, [namely] ΓE, and there has been constructed on ΔE an equilateral triangle, ZΔE, and there has been joined ZΓ.	Εἰλήφθω ἐπὶ τῆς ΑΓ τυχὸν σημεῖον τὸ Δ, καὶ κείσθω τῇ ΓΔ ἴση ἡ ΓΕ, καὶ συνεστάτω ἐπὶ τῆς ΔΕ τρίγωνον ἰσόπλευρον τὸ ΖΔΕ, καὶ ἐπεζεύχθω ἡ ΖΓ·	Kabul edelim ki seçilmiş olsun AΓ doğrusunda rastgele bir nokta, Δ, ve yerleştirilmiş olsub ΓE eşit olarak ΓΔ doğrusuna, ve inşa edilmiş olsun ΔE üzerinde bir eşkenar üçgen, ZΔE, ve ZΓ birleştirilmiş olsun.
I say that to the given straight line AB from the given point on it, Γ, at right angles has been drawn a straight line, ZΓ. For, since ΔΓ is equal to ΓE, and ΓZ is common, the two, ΔΓ and ΓZ, to the two, EΓ and ΓZ, are equal, either to either; and the base ΔZ to the base ZE is equal; therefore angle ΔΓZ to angle EΓZ is equal; and they are adjacent. Whenever a STRAIGHT, standing on a STRAIGHT, the adjacent angles equal to one another make,	λέγω, ὅτι τῇ δοθείσῃ εὐθείᾳ τῇ ΑΒ ἀπὸ τοῦ πρὸς αὐτῇ δοθέντος σημείου τοῦ Γ πρὸς ὀρθὰς γωνίας εὐθεῖα γραμμὴ ἦκται ἡ ΖΓ. Ἐπεὶ γὰρ ἴση ἐστὶν ἡ ΔΓ τῇ ΓΕ, κοινὴ δὲ ἡ ΓΖ, δύο δὴ αἱ ΔΓ, ΓΖ δυσὶ ταῖς ΕΓ, ΓΖ ἴσαι εἰσὶν ἑκατέρα ἑκατέρᾳ· καὶ βάσις ἡ ΔΖ βάσει τῇ ΖΕ ἴση ἐστίν· γωνία ἄρα ἡ ὑπὸ ΔΓΖ γωνίᾳ τῇ ὑπὸ ΕΓΖ ἴση ἐστίν· καί εἰσιν ἐφεξῆς. ὅταν δὲ εὐθεῖα ἐπ᾽ εὐθεῖαν σταθεῖσα τὰς ἐφεξῆς γωνίας ἴσας ἀλλήλαις ποιῇ,	İddia ediyorum ki verilen AB doğrusuna üzerindeki Γ noktasında dik açılarda bir ZΓ doğrusu çizilmişoldu. Çünkü, ΔΓ eşit olduğundan ΓE doğrusuna, ve ΓZ ortak olduğundan, ΔΓ ve ΓZ ikilisi, eşittirler EΓ ve ΓZ ikilisinin, her biri birine; ve ΔZ tabanı eşittir ZE tabanına; dolayısıyla ΔΓZ açısı eşittir EΓZ açısına; ve bitişiktirler. Ne zaman bir doğru, bir doğru üzerinde dikilen, bitişik açıları birbirine eşit yaparsa, bu açıların her biri dik olur. Dolayısıyla ΔΓZ, ZΓE açılarının her ikisi de diktir.

[1] This is the first time among the propositions that Euclid writes out *straight line* (εὐθεῖα γραμμή) and not just *straight* (εὐθεῖα).

[2] Literally 'lead, conduct'.

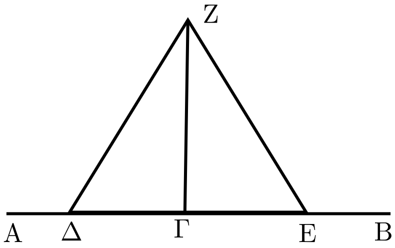
either of the equal angles is right.
Right therefore is either of the angles
ΔΓΖ and ΖΓΕ.

ὀρθὴ ἑκατέρα τῶν ἴσων γωνιῶν ἐστιν·
ὀρθὴ ἄρα ἐστὶν ἑκατέρα τῶν
ὑπὸ ΔΓΖ, ΖΓΕ.

Therefore, to the given STRAIGHT AB,
from the given point on it,
Γ,
at right angles,
has been drawn the straight line ΓΖ;
—just what it was necessary to do.

Τῇ ἄρα δοθείσῃ εὐθείᾳ τῇ ΑΒ
ἀπὸ τοῦ πρὸς αὐτῇ δοθέντος σημείου
τοῦ Γ
πρὸς ὀρθὰς γωνίας
εὐθεῖα γραμμὴ ἦκται ἡ ΓΖ·
ὅπερ ἔδει ποιῆσαι.

Dolayısıyla, verilen AB doğrusuna,
üzerinde verilmiş Γ noktasında,
dik açılarda,
bir ΓZ doğrusu çizilmiş oldu;
—yapılması gereken tam buydu.



1.12

To the given unbounded STRAIGHT,
from the given point,
which is not on it,
to draw a perpendicular straight line.

Ἐπὶ τὴν δοθεῖσαν εὐθεῖαν ἄπειρον
ἀπὸ τοῦ δοθέντος σημείου,
ὃ μή ἐστιν ἐπ᾽ αὐτῆς,
κάθετον εὐθεῖαν γραμμὴν ἀγαγεῖν.

Verilen sınırlanmamış doğruya,
verilen bir noktadan,
üzerinde olmayan,
bir dik doğru çizmek.

Let be
the given unbounded STRAIGHT AB,
and the given point,
which is not on it,
Γ.

Ἔστω
ἡ μὲν δοθεῖσα εὐθεῖα ἄπειρος ἡ ΑΒ
τὸ δὲ δοθὲν σημεῖον,
ὃ μή ἐστιν ἐπ᾽ αὐτῆς,
τὸ Γ·

Verilmiş olsun
bir sınırlanmamış doğru, AB,
ve bir nokta,
üzerinde olmayan, Γ.

It is necessary then
to the given unbounded STRAIGHT,
AB
from the given point Γ,
which is not on it,
to draw a perpendicular straight line.

δεῖ δὴ
ἐπὶ τὴν δοθεῖσαν εὐθεῖαν ἄπειρον
τὴν ΑΒ
ἀπὸ τοῦ δοθέντος σημείου τοῦ Γ,
ὃ μή ἐστιν ἐπ᾽ αὐτῆς,
κάθετον εὐθεῖαν γραμμὴν ἀγαγεῖν.

Gereklidir
verilmiş AB sınırlanmamış doğrusuna
verilmiş Γ noktasından,
üzerinde olmayan,
bir dik doğru çizmek.

For suppose there has been chosen
on the other parts
of the STRAIGHT AB
at random a point Δ,
and to the center Γ,
at the distance ΓΔ,
a circle has been drawn, EZH,
and has been cut
the STRAIGHT EH
in two at Θ,
and there have been joined
the STRAIGHTS ΓH, ΓΘ, and ΓE.

Εἰλήφθω γὰρ
ἐπὶ τὰ ἕτερα μέρη
τῆς ΑΒ εὐθείας
τυχὸν σημεῖον τὸ Δ,
καὶ κέντρῳ μὲν τῷ Γ
διαστήματι δὲ τῷ ΓΔ
κύκλος γεγράφθω ὁ ΕΖΗ,
καὶ τετμήσθω
ἡ ΕΗ εὐθεῖα
δίχα κατὰ τὸ Θ,
καὶ ἐπεζεύχθωσαν
αἱ ΓΗ, ΓΘ, ΓΕ εὐθεῖαι·

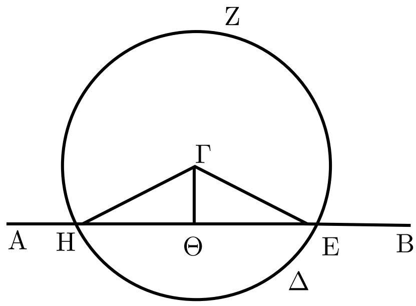
Çünkü kabul edelim ki seçilmiş olsun
AB doğrusunun diğer tarafında
rastgele bir Δ noktası,
ve Γ merkezinde,
ΓΔ uzaklığında,
bir çember çizilmiş olsun, EZH,
ve EH doğrusu Θ noktasında ikiye kesilmiş olsun,
ve birleştirilmiş olsun
ΓH, ΓΘ, ve ΓE doğruları.

I say that
to the given unbounded STRAIGHT
AB,
from the given point Γ,
which is not on it,
has been drawn a perpendicular, ΓΘ.
For, because HΘ is equal to ΘE,
and ΘΓ is common,
the two, HΘ and ΘΓ,

λέγω, ὅτι
ἐπὶ τὴν δοθεῖσαν εὐθεῖαν ἄπειρον
τὴν ΑΒ
ἀπὸ τοῦ δοθέντος σημείου τοῦ Γ,
ὃ μή ἐστιν ἐπ᾽ αὐτῆς,
κάθετος ἦκται ἡ ΓΘ.
Ἐπεὶ γὰρ ἴση ἐστὶν ἡ ΗΘ τῇ ΘΕ,
κοινὴ δὲ ἡ ΘΓ,
δύο δὴ αἱ ΗΘ, ΘΓ

İddia ediyorum ki
verilen sınırlanmamış AB doğrusuna,
verilen Γ noktasından,
üzerinde olmayan,
çizilmiş oldu dik ΓΘ doğrusu.
Çünkü, HΘ eşit olduğundan ΘE doğrusuna,
ve ΘΓ ortak,
HΘ ve ΘΓ ikilisi,

to the two, EΘ and ΘΓ, are equal, either to either; and the base ΓH to the base ΓE is equal; therefore angle ΓΘH to angle EΘΓ is equal; and they are adjacent. Whenever a STRAIGHT, standing on a STRAIGHT, the adjacent angles equal to one another make, right either of the equal angles is, and the STRAIGHT that has been stood is called perpendicular to that on which it has been stood.	δύο ταῖς ΕΘ, ΘΓ ἴσαι εἰσὶν ἑκατέρα ἑκατέρᾳ· καὶ βάσις ἡ ΓΗ βάσει τῇ ΓΕ ἐστιν ἴση· γωνία ἄρα ἡ ὑπὸ ΓΘΗ γωνίᾳ τῇ ὑπὸ ΕΘΓ ἐστιν ἴση. καί εἰσιν ἐφεξῆς. ὅταν δὲ εὐθεῖα ἐπ᾽ εὐθεῖαν σταθεῖσα τὰς ἐφεξῆς γωνίας ἴσας ἀλλήλαις ποιῇ, ὀρθὴ ἑκατέρα τῶν ἴσων γωνιῶν ἐστιν, καὶ ἡ ἐφεστηκυῖα εὐθεῖα κάθετος καλεῖται ἐφ᾽ ἣν ἐφέστηκεν.	eşittirler EΘ ve ΘΓ ikilisinin, her biri birine; ve ΓH tabanı eşittir ΓE tabanına; dolayısıyla ΓΘH açısı eşittir EΘΓ açısına. Ve onlar bitişiktirler. Ne zaman bir doğru, bir doğru üzerinde dikildiğinde, bitişik açıları birbirine eşit yaparsa, açıların her biri eşittir, ve dikiltilen doğru üzerinde dikildiği doğruya diktir denir.
Therefore, to the given unbounded STRAIGHT AB, from the given point Γ, which is not on it, a perpendicular ΓΘ has been drawn; —just what it was necessary to do.	Ἐπὶ τὴν δοθεῖσαν ἄρα εὐθεῖαν ἄπειρον τὴν ΑΒ ἀπὸ τοῦ δοθέντος σημείου τοῦ Γ, ὃ μή ἐστιν ἐπ᾽ αὐτῆς, κάθετος ἦκται ἡ ΓΘ· ὅπερ ἔδει ποιῆσαι.	Dolayısıyla, verilen AB sınırlandırılmamış doğruya, verilen Γ noktasından, üzerinde olmayan, bir dik, ΓΘ, çizilmiş oldu; —yapılması gereken tam buydu.



1.13

If a STRAIGHT, stood on a STRAIGHT, make angles, either two RIGHTs or equal to two RIGHTs it will make [them].	Ἐὰν εὐθεῖα ἐπ᾽ εὐθεῖαν σταθεῖσα γωνίας ποιῇ, ἤτοι δύο ὀρθὰς ἢ δυσὶν ὀρθαῖς ἴσας ποιήσει.	Eğer bir doğru, dikiltilmiş bir doğrunun üzerine, yaparsa açılar, ya iki dik ya da iki dike eşit yapacak (onları).
For, some STRAIGHT, AB, stood on the STRAIGHT ΓΔ, —suppose it makes[1] angles ΓBA and ABΔ.	Εὐθεῖα γάρ τις ἡ ΑΒ ἐπ᾽ εὐθεῖαν τὴν ΓΔ σταθεῖσα γωνίας ποιείτω τὰς ὑπὸ ΓΒΑ, ΑΒΔ·	Çünkü, bir AB doğrusuda, dikiltilmiş ΓΔ doğrusu, —kabul edelim ki ΓBA ve ABΔ açılarını oluşturmuş olsun.
I say that the angles ΓBA and ABΔ either are two RIGHTs or [are] equal to two RIGHTs.	λέγω, ὅτι αἱ ὑπὸ ΓΒΑ, ΑΒΔ γωνίαι ἤτοι δύο ὀρθαί εἰσιν ἢ δυσὶν ὀρθαῖς ἴσαι.	İddia ediyorum ki ΓBA ve ABΔ açıları ya iki dik açıdır ya da iki dik açıya eşittir(ler).
If equal is ΓBA to ABΔ, they are two RIGHTs.	Εἰ μὲν οὖν ἴση ἐστὶν ἡ ὑπὸ ΓΒΑ τῇ ὑπὸ ΑΒΔ, δύο ὀρθαί εἰσιν.	Eğer ΓBA eşitse ABΔ açısına, iki dik açıdırlar.
If not,	εἰ δὲ οὔ,	Eğer değilse,

[1]Euclid uses a *present, active* imperative here.

suppose there has been drawn,
from the point B,
to the [straight] ΓΔ,
at right angles,
BE.

Therefore ΓBE and EBΔ
are two rights;
and since ΓBE
to the two, ΓBA and ABE, is equal
let there be added in common EBΔ.
Therefore ΓBE and EBΔ
to the three, ΓBA, ABE, and EBΔ,
are equal.
Moreover,
since ΔBA
to the two, ΔBE and EBA, is equal
let there be added in common ABΓ;
therefore ΔBA and ABΓ
to the three, ΔBE, EBA, and ABΓ,
are equal.
And ΓBE and EBΔ were shown
equal to the same three.
And equals to the same
are also equal to one another;
also, therefore, ΓBE and EBΔ
to ΔBA and ABΓ are equal;
but ΓBE and EBΔ
are two rights;
and therefore ΔBA and ABΓ
are equal to two rights.

If, therefore, a straight,
stood on a straight,
make angles,
either two rights
or equal to two rights
it will make;
—just what it was necessary to show.

ἤχθω
ἀπὸ τοῦ B σημείου
τῇ ΓΔ [εὐθείᾳ]
πρὸς ὀρθὰς
ἡ BE·

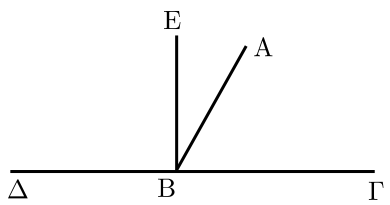
αἱ ἄρα ὑπὸ ΓBE, EBΔ
δύο ὀρθαί εἰσιν·
καὶ ἐπεὶ ἡ ὑπὸ ΓBE
δυσὶ ταῖς ὑπὸ ΓBA, ABE ἴση ἐστίν,
κοινὴ προσκείσθω ἡ ὑπὸ EBΔ·
αἱ ἄρα ὑπὸ ΓBE, EBΔ
τρισὶ ταῖς ὑπὸ ΓBA, ABE, EBΔ
ἴσαι εἰσίν.
πάλιν,
ἐπεὶ ἡ ὑπὸ ΔBA
δυσὶ ταῖς ὑπὸ ΔBE, EBA ἴση ἐστίν,
κοινὴ προσκείσθω ἡ ὑπὸ ABΓ·
αἱ ἄρα ὑπὸ ΔBA, ABΓ
τρισὶ ταῖς ὑπὸ ΔBE, EBA, ABΓ
ἴσαι εἰσίν.
ἐδείχθησαν δὲ καὶ αἱ ὑπὸ ΓBE, EBΔ
τρισὶ ταῖς αὐταῖς ἴσαι·
τὰ δὲ τῷ αὐτῷ ἴσα
καὶ ἀλλήλοις ἐστὶν ἴσα·
καὶ αἱ ὑπὸ ΓBE, EBΔ ἄρα
ταῖς ὑπὸ ΔBA, ABΓ ἴσαι εἰσίν·
ἀλλὰ αἱ ὑπὸ ΓBE, EBΔ
δύο ὀρθαί εἰσιν·
καὶ αἱ ὑπὸ ΔBA, ABΓ ἄρα
δυσὶν ὀρθαῖς ἴσαι εἰσίν.

Ἐὰν ἄρα εὐθεῖα
ἐπ᾿ εὐθεῖαν σταθεῖσα
γωνίας ποιῇ,
ἤτοι δύο ὀρθὰς
ἢ δυσὶν ὀρθαῖς ἴσας
ποιήσει [τηεμ]·
ὅπερ ἔδει δεῖξαι.

kabul edelim ki çizilmiş olsun,
B noktasından,
ΓΔ doğrusuna,
dik açılarda,
BE.

Dolayısıyla ΓBE ve EBΔ iki diktir;
ve olduğundan ΓBE
eşit ΓBA ve ABE ikilisine,
EBΔ her birine eklenmiş olsun.
Dolayısıyla ΓBE ve EBΔ
eşittirler,
ΓBA, ABE ve EBΔ üçlüsüne.
Dahası,
olduğundan ΔBA
eşit, ΔBE ve EBA ikilisine,
ABΓ her birine eklenmiş olsun;
dolayısıyla ΔBA ve ABΓ
eşittirler,
ΔBE, EBA ve ABΓ üçlüsüne.
Ve ΓBE ve EBΔ açılarının gösterilmişti
eşitliği aynı üçlüye.
Ve aynı şeye eşit olanlar birbirine eşittir;
ve, dolayısıyla, ΓBE ve EBΔ
eşittirler ΔBA ve ABΓ açılarına;
ama ΓBE veEBΔ iki diktir;
ve dolayısıyla ΔBA ve ABΓ
iki dike eşittirler.

Eğer, dolayısıyla, bir doğru,
dikiltilmiş bir doğrunun üzerine,
yaparsa açılar,
ya iki dik
ya da iki dike eşit
olacak (onları).
—gösterilmesi gereken tam buydu.



1.14

If to some straight,
and at the same point,
two straights,
not lying to the same parts,
the adjacent angles
to two rights
make equal,
on a straight
will be with one another
the straights.

Ἐὰν πρός τινι εὐθείᾳ
καὶ τῷ πρὸς αὐτῇ σημείῳ
δύο εὐθεῖαι
μὴ ἐπὶ τὰ αὐτὰ μέρη κείμεναι
τὰς ἐφεξῆς γωνίας
δυσὶν ὀρθαῖς ἴσας
ποιῶσιν,
ἐπ᾿ εὐθείας
ἔσονται ἀλλήλαις
αἱ εὐθεῖαι.

Eğer bir doğruya,
ve aynı noktasında,
iki doğru,
aynı tarafında kalmayan,
bitişik açıları,
yaparsa
iki dik açıya eşit
bir doğruda
olacaklar birbirleriyle,
doğrular.

For, to some STRAIGHT, AB,
and at the same point, B,
two STRAIGHTs ΒΓ and ΒΔ,
not lying to the same parts,
the adjacent angles
ΑΒΓ and ΑΒΔ
equal to two RIGHTs
—suppose they make.

I say that
on a STRAIGHT
with ΓΒ is ΒΔ.

For, if it is not
with ΒΓ on a STRAIGHT,
[namely] ΒΔ,
let there be,
with ΒΓ in a STRAIGHT,
ΒΕ.

For, since the STRAIGHT ΑΒ
has stood[1] to the STRAIGHT ΓΒΕ,
therefore angles ΑΒΓ and ΑΒΕ
are equal to two RIGHTs.
Also ΑΒΓ and ΑΒΔ
are equal to two RIGHTs.
Therefore ΓΒΑ and ΑΒΕ
are equal to ΓΒΑ and ΑΒΔ.
In common
suppose there has been taken away
ΓΒΑ;
therefore the remainder ΑΒΕ
to the remainder ΑΒΔ is equal,
the less to the greater;
which is impossible.
Therefore it is not [the case that]
ΒΕ is on a STRAIGHT with ΓΒ.
Similarly we[2] shall show that
no other [is so], except ΒΔ.
Therefore on a STRAIGHT
is ΓΒ with ΒΔ.

If, therefore, to some STRAIGHT,
and at the same point,
two STRAIGHTS,
not lying in the same parts,
adjacent angles
two right angles
make,
on a STRAIGHT
will be with one another
the STRAIGHTS;
—just what it was necessary to show.

Πρὸς γάρ τινι εὐθείᾳ τῇ ΑΒ
καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ Β
δύο εὐθεῖαι αἱ ΒΓ, ΒΔ
μὴ ἐπὶ τὰ αὐτὰ μέρη κείμεναι
τὰς ἐφεξῆς γωνίας
τὰς ὑπὸ ΑΒΓ, ΑΒΔ
δύο ὀρθαῖς ἴσας
ποιείτωσαν·

λέγω, ὅτι
ἐπ᾿ εὐθείας
ἐστὶ τῇ ΓΒ ἡ ΒΔ.

Εἰ γὰρ μή ἐστι
τῇ ΒΓ ἐπ᾿ εὐθείας
ἡ ΒΔ,
ἔστω
τῇ ΓΒ ἐπ᾿ εὐθείας
ἡ ΒΕ.

Ἐπεὶ οὖν εὐθεῖα ἡ ΑΒ
ἐπ᾿ εὐθεῖαν τὴν ΓΒΕ ἐφέστηκεν,
αἱ ἄρα ὑπὸ ΑΒΓ, ΑΒΕ γωνίαι
δύο ὀρθαῖς ἴσαι εἰσίν·
εἰσὶ δὲ καὶ αἱ ὑπὸ ΑΒΓ, ΑΒΔ
δύο ὀρθαῖς ἴσαι·
αἱ ἄρα ὑπὸ ΓΒΑ, ΑΒΕ
ταῖς ὑπὸ ΓΒΑ, ΑΒΔ ἴσαι εἰσίν.
κοινὴ
ἀφῃρήσθω
ἡ ὑπὸ ΓΒΑ·
λοιπὴ ἄρα ἡ ὑπὸ ΑΒΕ
λοιπῇ τῇ ὑπὸ ΑΒΔ ἐστιν ἴση,
ἡ ἐλάσσων τῇ μείζονι·
ὅπερ ἐστὶν ἀδύνατον.
οὐκ ἄρα
ἐπ᾿ εὐθείας ἐστὶν ἡ ΒΕ τῇ ΓΒ.
ὁμοίως δὴ δείξομεν, ὅτι
οὐδὲ ἄλλη τις πλὴν τῆς ΒΔ·
ἐπ᾿ εὐθείας ἄρα
ἐστὶν ἡ ΓΒ τῇ ΒΔ.

Ἐὰν ἄρα πρός τινι εὐθείᾳ
καὶ τῷ πρὸς αὐτῇ σημείῳ
δύο εὐθεῖαι
μὴ ἐπὶ αὐτὰ μέρη κείμεναι
τὰς ἐφεξῆς γωνίας
δυσὶν ὀρθαῖς ἴσας
ποιῶσιν,
ἐπ᾿ εὐθείας
ἔσονται ἀλλήλαις
αἱ εὐθεῖαι·
ὅπερ ἔδει δεῖξαι.

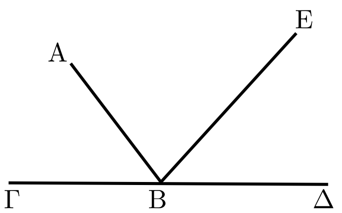
Bir AB doğrusuna,
ve bir B noktasında,
aynı tarafında kalmayan,
iki ΒΓ ve ΒΔ doğrularının,
ΑΒΓ ve ΑΒΔ
bitişik açılarının iki dik açı
—olduğu kabul edilsin.

İddia ediyorum ki
ΒΔ ile ΓΒ bir doğrudadır.

Çünkü, eğer değilse
bir doğruda ΒΓ ile,
ΒΔ,
olsun,
bir doğruda ΒΓ ile,
ΒΕ.

Çünkü, AB doğrusu
dikiltilmiş olur ΓΒΕ doğrusuna,
dolayısıyla ΑΒΓ ve ΑΒΕ açıları
eşittirler iki dik açıya.
Ayrıca ΑΒΓ ve ΑΒΔ
eşittirler iki dik açıya.
Dolayısıyla ΓΒΑ ve ΑΒΕ
eşittirler ΓΒΑ ve ΑΒΔ açılarına.
Ortak ΓΒΑ açısının çıkartıldığı kabul edilsin.
Dolayısıyla ΑΒΕ kalanı
eşittir ΑΒΔ kalanına,
küçük olan büyüğe;
ki bu imkansızdır.
Dolayısıyla değildir [durum] şöyle;
ΒΕ bir doğrudadır ΓΒ doğrusuyla.
Benzer şekilde göstereceğiz ki
hiçbiri [öyledir], ΒΔ dışında.
Dolayısıyla ΓΒ bir doğrudadır ΒΔ ile.

Eğer, dolayısıyla, bir doğruya,
ve aynı noktasında,
iki doğru,
aynı tarafında kalmayan,
bitişik açıları,
yaparsa
iki dik açıya eşit
bir doğruda
olacaklar birbirleriyle,
doğrular. —gösterilmesi gereken tam buydu.

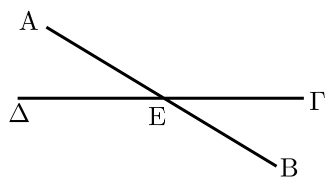


[1] The English perfect sounds strange here, but the point may be that the standing has already come to be and will continue.

[2] This seems to be the first use of the first person *plural*.

1.15

If two straights cut one another,	Ἐὰν δύο εὐθεῖαι τέμνωσιν ἀλλήλας,	Eğer iki doğru keserse birbirini,
the vertical[1] angles	τὰς κατὰ κορυφὴν γωνίας	ters açılar
they make equal to one another.	ἴσας ἀλλήλαις ποιοῦσιν.	oluşturlar eşit bir birine.
For, let the straights ΑΒ and ΓΔ	Δύο γὰρ εὐθεῖαι αἱ ΑΒ, ΓΔ	Çünkü, ΑΒ ve ΓΔ doğruları
cut one another	τεμνέτωσαν ἀλλήλας	kessinler birbirlerini
at the point Ε.	κατὰ τὸ Ε σημεῖον·	Ε noktasında.
I say that	λέγω, ὅτι	İddia ediyorum ki
equal are	ἴση ἐστὶν	eşittirler
angle ΑΕΓ to ΔΕΒ,	ἡ μὲν ὑπὸ ΑΕΓ γωνία τῇ ὑπὸ ΔΕΒ,	ΑΕΓ açısı ΔΕΒ açısına,
and ΓΕΒ to ΑΕΔ.	ἡ δὲ ὑπὸ ΓΕΒ τῇ ὑπὸ ΑΕΔ.	ve ΓΕΒ açısı ΑΕΔ açısına.
For, since the straight ΑΕ	Ἐπεὶ γὰρ εὐθεῖα ἡ ΑΕ	Çünkü, ΑΕ doğrusu
has stood to the straight ΓΔ,	ἐπ᾿ εὐθεῖαν τὴν ΓΔ ἐφέστηκε	yerleşmişti ΓΔ doğrusuna,
making angles ΓΕΑ and ΑΕΔ,	γωνίας ποιοῦσα τὰς ὑπὸ ΓΕΑ, ΑΕΔ,	oluşturur ΓΕΑ ve ΑΕΔ açılarını,
therefore angles ΓΕΑ and ΑΕΔ	αἱ ἄρα ὑπὸ ΓΕΑ, ΑΕΔ γωνίαι	dolayısıyla ΓΕΑ ve ΑΕΔ açıları
are equal to two rights.	δυσὶν ὀρθαῖς ἴσαι εἰσίν.	eşittirler iki dik açıya.
Moreover,	πάλιν,	Dahası,
since the straight ΔΕ	ἐπεὶ εὐθεῖα ἡ ΔΕ	ΔΕ doğrusu
has stood to the straight ΑΒ,	ἐπ᾿ εὐθεῖαν τὴν ΑΒ ἐφέστηκε	dikiltilmişti ΑΒ doğrusuna,
making angles ΑΕΔ and ΔΕΒ,	γωνίας ποιοῦσα τὰς ὑπὸ ΑΕΔ, ΔΕΒ,	oluşturarak ΑΕΔ ve ΔΕΒ açılarını,
therefore angles ΑΕΔ and ΔΕΒ	αἱ ἄρα ὑπὸ ΑΕΔ, ΔΕΒ γωνίαι	dolayısıyla ΑΕΔ ve ΔΕΒ açıları
are equal to two rights.	δυσὶν ὀρθαῖς ἴσαι εἰσίν.	eşittirler iki dik açıya.
And ΓΕΑ and ΑΕΔ were shown	ἐδείχθησαν δὲ καὶ αἱ ὑπὸ ΓΕΑ, ΑΕΔ	Ve ΓΕΑ ve ΑΕΔ açılarının göster-
equal to two rights;	δυσὶν ὀρθαῖς ἴσαι·	ilmişti
therefore ΓΕΑ and ΑΕΔ	αἱ ἄρα ὑπὸ ΓΕΑ, ΑΕΔ	eşitliği iki dik açıya,
are equal to ΑΕΔ and ΔΕΒ.	ταῖς ὑπὸ ΑΕΔ, ΔΕΒ ἴσαι εἰσίν.	dolayısıyla ΓΕΑ ve ΑΕΔ
In common	κοινὴ	eşittirler ΑΕΔ ve ΔΕΒ açılarına.
suppose there has been taken away	ἀφῃρήσθω	Ortak ΑΕΔ açısının çıkartılmış
ΑΕΔ;	ἡ ὑπὸ ΑΕΔ·	olduğu kabul edilsin;
therefore the remainder ΓΕΑ	λοιπὴ ἄρα ἡ ὑπὸ ΓΕΑ	dolayısıyla ΓΕΑ kalanı
is equal to the remainder ΒΕΔ;	λοιπῇ τῇ ὑπὸ ΒΕΔ ἴση ἐστίν·	eşittir ΒΕΔ kalanına;
similarly it will be shown that	ὁμοίως δὴ δειχθήσεται, ὅτι	benzer şekilde gösterilecek ki
also ΓΕΒ and ΔΕΑ are equal.[2]	καὶ αἱ ὑπὸ ΓΕΒ, ΔΕΑ ἴσαι εἰσίν.	ΓΕΒ açısı da eşittir ΔΕΑ açısına.
If, therefore,	Ἐὰν ἄρα	Eğer, dolayısıyla,
two straights cut one another,	δύο εὐθεῖαι τέμνωσιν ἀλλήλας,	iki doğru keserse bir birini,
the vertical angles	τὰς κατὰ κορυφὴν γωνίας	ters açılar
they make equal to one another;	ἴσας ἀλλήλαις ποιοῦσιν·	oluşturlar eşit birbirine
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	—gösterilmesi gereken tam buydu.



1.16

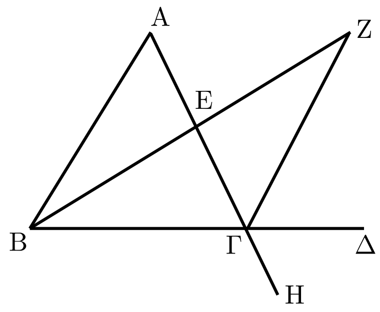
One of the sides of any triangle	Παντὸς τριγώνου μιᾶς τῶν πλευρῶν	Herhangi bir üçgenin kenarlarından
being extended,	προσεκβληθείσης	biri
the exterior angle	ἡ ἐκτὸς γωνία	uzatılıdığında,
than either	ἑκατέρας	dış açı

[1]The Greek is κατὰ κορυφὴν, which might be translated as 'at a head', just as, in the conclusion of I.10, AB has been cut in two 'at Δ', κατὰ τὸ Δ. But κορυφή and the Latin *vertex* can both mean *crown of the head,* and in anatomical use, the English *vertical* refers to this crown. Apollonius uses κορυφή for the vertex of a cone [17, pp. 286–7].

[2]This is a rare moment when two things are said to be equal *simply,* and not equal *to one another.*

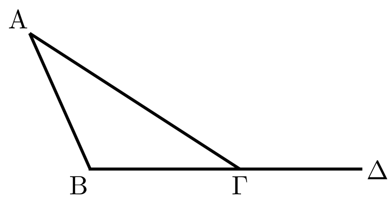
of the interior and opposite angles is greater.	τῶν ἐντὸς καὶ ἀπεναντίον γωνιῶν μείζων ἐστίν.	her bir iç ve karşıt açıdan büyüktür.
Let there be a triangle, ΑΒΓ, and let there have been extended its side ΒΓ, to Δ.	Ἔστω τρίγωνον τὸ ΑΒΓ, καὶ προσεκβεβλήσθω αὐτοῦ μία πλευρὰ ἡ ΒΓ ἐπὶ τὸ Δ·	Olsun, bir ΑΒΓ üçgeni ve uzatılmış olsun onun ΒΓ kenarı Δ noktasına.
I say that the exterior angle ΑΓΔ is greater than either of the two interior and opposite angles, ΓΒΑ and ΒΑΓ.	λὲγω, ὅτι ἡ ἐκτὸς γωνία ἡ ὑπὸ ΑΓΔ μείζων ἐστὶν ἑκατέρας τῶν ἐντὸς καὶ ἀπεναντίον τῶν ὑπὸ ΓΒΑ, ΒΑΓ γωνιῶν.	İddia ediyorum ki ΑΓΔ dış açısı büyüktür her iki ΓΒΑ ve ΒΑΓ iç ve karşıt açılarından.
Suppose ΑΓ has been cut in two at Ε, and ΒΕ, being joined, —suppose it has been extended on a STRAIGHT to Ζ, and there has been laid down, equal to ΒΕ, ΕΖ, and there has been joined ΖΓ, and there has been drawn through ΑΓ to Η.	Τετμήσθω ἡ ΑΓ δίχα κατὰ τὸ Ε, καὶ ἐπιζευχθεῖσα ἡ ΒΕ ἐκβεβλήσθω ἐπ᾽ εὐθείας ἐπὶ τὸ Ζ, καὶ κείσθω τῇ ΒΕ ἴση ἡ ΕΖ, καὶ ἐπεζεύχθω ἡ ΖΓ, καὶ διήχθω ἡ ΑΓ ἐπὶ τὸ Η.	ΑΓ kenarı, Ε noktasından ikiye kesilmiş olsun, ve birleştirilen ΒΕ, —uzatılmış olsun Ζ noktasına bir doğruda ve yerleştirilmiş olsun, ΒΕ doğrusuna eşit olan ΕΖ, ve birleştirilmiş olsun ΖΓ, ve çizilmiş olsun ΑΓ doğrusu Η noktasına kadar.
Since equal are ΑΕ to ΕΓ, and ΒΕ to ΕΖ, the two, ΑΕ and ΕΒ to the two, ΓΕ and ΕΖ, are equal, either to either; and angle ΑΕΒ is equal to angle ΖΕΓ; for they are vertical; therefore the base ΑΒ is equal to the base ΖΓ, and triangle ΑΒΕ is equal to triangle ΖΕΓ, and the remaining angles are equal to the remaining angles, either to either, which the equal sides subtend. Therefore equal are ΒΑΕ and ΕΓΖ. but greater is ΕΓΔ than ΕΓΖ; therefore greater [is] ΑΓΔ than ΒΑΕ. Similarly ΒΓ having been cut in two, it will be shown that ΒΓΗ, which is ΑΓΔ, [is] greater than ΑΒΓ.	Ἐπεὶ οὖν ἴση ἐστὶν ἡ μὲν ΑΕ τῇ ΕΓ, ἡ δὲ ΒΕ τῇ ΕΖ, δύο δὴ αἱ ΑΕ, ΕΒ δυσὶ ταῖς ΓΕ, ΕΖ ἴσαι εἰσὶν ἑκατέρα ἑκατέρᾳ· καὶ γωνία ἡ ὑπὸ ΑΕΒ γωνίᾳ τῇ ὑπὸ ΖΕΓ ἴση ἐστίν· κατὰ κορυφὴν γάρ· βάσις ἄρα ἡ ΑΒ βάσει τῇ ΖΓ ἴση ἐστίν, καὶ τὸ ΑΒΕ τρίγωνον τῷ ΖΕΓ τριγώνῳ ἐστὶν ἴσον, καὶ αἱ λοιπαὶ γωνίαι ταῖς λοιπαῖς γωνίαις ἴσαι εἰσὶν ἑκατέρα ἑκατέρᾳ, ὑφ᾽ ἃς αἱ ἴσαι πλευραὶ ὑποτείνουσιν· ἴση ἄρα ἐστὶν ἡ ὑπὸ ΒΑΕ τῇ ὑπὸ ΕΓΖ. μείζων δέ ἐστιν ἡ ὑπὸ ΕΓΔ τῆς ὑπὸ ΕΓΖ· μείζων ἄρα ἡ ὑπὸ ΑΓΔ τῆς ὑπὸ ΒΑΕ. Ὁμοίως δὴ τῆς ΒΓ τετμημένης δίχα δειχθήσεται καὶ ἡ ὑπὸ ΒΓΗ, τουτέστιν ἡ ὑπὸ ΑΓΔ, μείζων καὶ τῆς ὑπὸ ΑΒΓ.	Eşit olduğundan ΑΕ, ΕΓ doğrusuna, ve ΒΕ, ΕΖ doğrusuna, ΑΕ ve ΕΒ ikilisi, eşittirler ΓΕ ve ΕΖ ikilisinin, her biri birine; ve ΑΕΒ açısı eşittir ΖΕΓ açısına; dikey olduklarından; dolayısıyla ΑΒ tabanı eşittir ΖΓ tabanına, ve ΑΒΕ üçgeni eşittir ΖΕΓ üçgenine, ve kalan açılar eşittirler kalan açıların, her biri birine, (yani) eşit kenarları görenler. Dolayısıyla eşittirler ΕΓΔ ve ΕΓΖ. Ama büyüktür ΒΑΕ, ΕΓΖ açısından; dolayısıyla büyüktür ΑΓΔ, ΒΑΕ açısından. Benzer şekilde ikiye kesilmiş olduğundan ΒΓ , gösterilecek ki ΒΓΗ, ΑΓΔ açısına eşit olan, büyüktür ΑΒΓ açısından.
Therefore, of any triangle, one of the sides being extended, the exterior angle than either	Παντὸς ἄρα τριγώνου μιᾶς τῶν πλευρῶν προσεκβληθείσης ἡ ἐκτὸς γωνία εκατέρας	Dolayısıyla, herhangi bir üçgenin, kenarlarından biri uzatıldığında, dış açı her bir

of the interior and opposite angles is greater; —just what it was necessary to show.	τῶν ἐντὸς καὶ ἀπεναντίον γωνιῶν μείζων ἐστίν· ὅπερ ἔδει δεῖξαι.	iç ve karşıt açıdan büyüktür; —gösterilmesi gereken tam buydu.



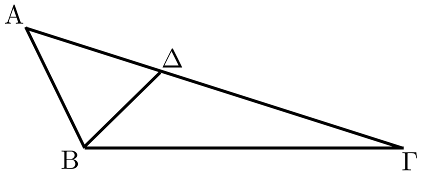
1.17

Two angles of any triangle are less than two RIGHTs —taken anyhow.	Παντὸς τριγώνου αἱ δύο γωνίαι δύο ὀρθῶν ἐλάσσονές εἰσι πάντῄ μεταλαμβανόμεναι.	Herhangi bir üçgenin iki açısı küçüktür iki dik açıdan —nasıl alınırsa alınan.
Let there be a triangle, ΑΒΓ.	Ἔστω τρίγωνον τὸ ΑΒΓ·	Olsun bir ΑΒΓ üçgeni.
I say that two angles of triangle ΑΒΓ are less than two RIGHTs —taken anyhow.	λέγω, ὅτι τοῦ ΑΒΓ τριγώνου αἱ δύο γωνίαι δύο ὀρθῶν ἐλάττονές εἰσι πάντη μεταλαμβανόμεναι.	İddia ediyorum ki ΑΒΓ üçgeninin iki açısı küçüktür iki dik açıdan —nasıl alınırsa alınsın.
For, suppose there has been extended ΒΓ to Δ.	Ἐκβεβλήσθω γὰρ ἡ ΒΓ ἐπὶ τὸ Δ.	Çünkü, uzatılmış olsun, ΒΓ, Δ noktasına.
And since, of triangle ΑΒΓ, ΑΓΔ is an exterior angle, it is greater than the interior and opposite ΑΒΓ. Let ΑΓΒ be added in common; therefore ΑΓΔ and ΑΓΒ are greater than ΑΒΓ and ΒΓΑ. But ΑΓΔ and ΑΓΒ are equal to two RIGHTs; therefore ΑΒΓ and ΒΓΑ are less than two RIGHTs. Similarly we shall show that also ΒΑΓ and ΑΓΒ are less than two RIGHTs, and yet [so are] ΓΑΒ and ΑΒΓ.	Καὶ ἐπεὶ τριγώνου τοῦ ΑΒΓ ἐκτός ἐστι γωνία ἡ ὑπὸ ΑΓΔ, μείζων ἐστὶ τῆς ἐντὸς καὶ ἀπεναντίον τῆς ὑπὸ ΑΒΓ. κοινὴ προσκείσθω ἡ ὑπὸ ΑΓΒ· αἱ ἄρα ὑπὸ ΑΓΔ, ΑΓΒ τῶν ὑπὸ ΑΒΓ, ΒΓΑ μείζονές εἰσιν. ἀλλ᾽ αἱ ὑπὸ ΑΓΔ, ΑΓΒ δύο ὀρθαῖς ἴσαι εἰσίν· αἱ ἄρα ὑπὸ ΑΒΓ, ΒΓΑ δύο ὀρθῶν ἐλάσσονές εἰσιν. ὁμοίως δὴ δείξομεν, ὅτι καὶ αἱ ὑπὸ ΒΑΓ, ΑΓΒ δύο ὀρθῶν ἐλάσσονές εἰσι καὶ ἔτι αἱ ὑπὸ ΓΑΒ, ΑΒΓ.	Ve ΑΒΓ üçgeninin, bir dış açısı olduğundan ΑΓΔ, büyüktür iç ve karşıt ΑΒΓ açısından. ΑΓΒ ortak açısı eklenmiş olsun; dolayısıyla ΑΓΔ ve ΑΓΒ büyüktürler ΑΒΓ ve ΒΓΑ açılarından. Ama ΑΓΔ ve ΑΓΒ eşittirler iki dik açıya; dolayısıyla ΑΒΓ ve ΒΓΑ küçüktürler iki dik açıdan. Benzer şekilde göstereceğiz ki ΒΑΓ ve ΑΓΒ de küçüktürler iki dik açıdan, ve sonra [öyledirler] ΓΑΒ ve ΑΒΓ.
Therefore two angles of any triangle are greater than two RIGHTs —taken anyhow; —just what it was necessary to show.	Παντὸς ἄρα τριγώνου αἱ δύο γωνίαι δύο ὀρθῶν ἐλάσςονές εἰσι πάντῄ μεταλαμβανόμεναι· ὅπερ ἔδει δεῖξαι.	Dolayısıyla herhangi bir üçgenin iki açısı küçüktür iki dik açıdan —nasıl alınırsa alınsın; —gösterilmesi gereken tam buydu.



1.18

Of any triangle, the greater side subtends the greater angle.[1]	Παντὸς τριγώνου ἡ μείζων πλευρὰ τὴν μείζονα γωνίαν ὑποτείνει.	Herhangi bir üçgende daha büyük bir kenar, daha büyük bir açıyı karşılar.
For, let there be a triangle, ΑΒΓ, having side ΑΓ greater than ΑΒ.	Ἔστω γὰρ τρίγωνον τὸ ΑΒΓ μείζονα ἔχον τὴν ΑΓ πλευρὰν τῆς ΑΒ·	Çünkü, verilmiş olsun bir ΑΒΓ üçgeni, ΑΓ kenarı daha büyük olan, ΑΒ kenarından.
I say that also angle ΑΒΓ is greater than ΒΓΑ.	λέγω, ὅτι καὶ γωνία ἡ ὑπὸ ΑΒΓ μείζων ἐστὶ τῆς ὑπὸ ΒΓΑ·	İddia ediyorum ki ΑΒΓ açısı da daha büyüktür, ΒΓΑ açısından.
For, since ΑΓ is greater than ΑΒ, suppose there has been laid down, equal to ΑΒ, ΑΔ, and let ΒΔ be joined.	Ἐπεὶ γὰρ μείζων ἐστὶν ἡ ΑΓ τῆς ΑΒ, κείσθω τῇ ΑΒ ἴση ἡ ΑΔ, καὶ ἐπεζεύχθω ἡ ΒΔ.	Çünkü ΑΓ, ΑΒ kenarından daha büyük olduğundan, yerleştirilmiş olsun, eşit olan ΑΒ kenarına, ΑΔ, ve ΒΔ birleştirilmiş olsun.
Since also, of triangle ΒΓΔ, angle ΑΔΒ is exterior, it is greater than the interior and opposite ΔΓΒ; and ΑΔΒ is equal to ΑΒΔ, since side ΑΒ is equal to ΑΔ; greater therefore is ΑΒΔ than ΑΓΒ; by much, therefore, ΑΒΓ is greater than ΑΓΒ.	Καὶ ἐπεὶ τριγώνου τοῦ ΒΓΔ ἐκτός ἐστι γωνία ἡ ὑπὸ ΑΔΒ, μείζων ἐστὶ τῆς ἐντὸς καὶ ἀπεναντίον τῆς ὑπὸ ΔΓΒ· ἴση δὲ ἡ ὑπὸ ΑΔΒ τῇ ὑπὸ ΑΒΔ, ἐπεὶ καὶ πλευρὰ ἡ ΑΒ τῇ ΑΔ ἐστιν ἴση· μείζων ἄρα καὶ ἡ ὑπὸ ΑΒΔ τῆς ὑπὸ ΑΓΒ· πολλῷ ἄρα ἡ ὑπὸ ΑΒΓ μείζων ἐστὶ τῆς ὑπὸ ΑΓΒ.	Ayrıca, ΒΓΔ üçgeninin, ΑΔΒ açısı dış açı olduğundan, büyüktür iç ve karşıt ΔΓΒ açısından; ve ΑΔΒ eşittir ΑΒΔ açısına, ΑΒ kenarı eşit olduğundan ΑΔ kenarına; büyüktür dolayısıyla ΑΒΔ, ΑΓΒ açısından; dolayısıyla, çok daha büyüktür ΑΒΓ, ΑΓΒ açısından.
Therefore, of any triangle, the greater side subtends the greater angle; —just what it was necessary to show.	Παντὸς ἄρα τριγώνου ἡ μείζων πλευρὰ τὴν μείζονα γωνίαν ὑποτείνει· ὅπερ ἔδει δεῖξαι.	Dolayısıyla, herhangi bir üçgende daha büyük bir kenar, daha büyük bir açıyı karşılar; —gösterilmesi gereken tam buydu.



1.19

Of any triangle, under the greater angle the greater side subtends.[1]	Παντὸς τριγώνου ὑπὸ τὴν μείζονα γωνίαν ἡ μείζων πλευρὰ ὑποτείνει.	Herhangi bir üçgende, daha büyük bir açı, daha büyük bir kenarca karşılanır.
For, let there be a triangle, ΑΒΓ, having angle ΑΒΓ greater than ΒΓΑ.	Ἔστω τρίγωνον τὸ ΑΒΓ μείζονα ἔχον τὴν ὑπὸ ΑΒΓ γωνίαν τῆς ὑπὸ ΒΓΑ·	Çünkü, verilmiş olsun bir ΑΒΓ üçgeni, ΑΒΓ açısı daha büyük olan, ΒΓΑ açısından.

[1] This enunciation has almost the same words as that of the next proposition. The object of the verb ὑποτείνει is preceded by the preposition ὑπό in the next enunciation, and not here. But the more important difference would seem to be word order: SUBJECT-OBJECT-VERB here, and OBJECT-SUBJECT-VERB in I.19. This difference in order ensures that I.19 is the converse of I.18.

[1] Heath here uses the expedient of the passive: 'The greater angle is subtended by the greater side.'

I say that
also side ΑΓ
is greater than side ΑΒ.

λέγω, ὅτι
καὶ πλευρὰ ἡ ΑΓ
πλευρᾶς τῆς ΑΒ μείζων ἐστίν.

İddia ediyorum ki
ΑΓ kenarı da
daha büyüktür ΑΒ kenarından.

For if not,
either ΑΓ is equal to ΑΒ
or less;
[but] ΑΓ is not equal to ΑΒ;
for [if it were],
also ΑΒΓ would be[2] equal to ΑΓΒ;
but it is not;
therefore ΑΓ is not equal to ΑΒ.
Nor is ΑΓ less than ΑΒ;
for [if it were],
also angle ΑΒΓ would be [less]
than ΑΓΒ;
but it is not;
therefore ΑΓ is not less than ΑΒ.
And it was shown that
it is not equal.
Therefore ΑΓ is greater than ΑΒ.

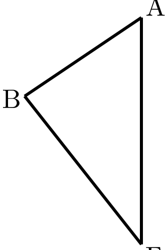
Εἰ γὰρ μή,
ἤτοι ἴση ἐστὶν ἡ ΑΓ τῇ ΑΒ
ἢ ἐλάσσων·
ἴση μὲν οὖν οὐκ ἔστιν ἡ ΑΓ τῇ ΑΒ·
ἴση γὰρ ἂν
ἦν καὶ γωνία ἡ ὑπὸ ΑΒΓ τῇ ὑπὸ ΑΓΒ·
οὐκ ἔστι δέ·
οὐκ ἄρα ἴση ἐστὶν ἡ ΑΓ τῇ ΑΒ.
οὐδὲ μὴν ἐλάσσων ἐστὶν ἡ ΑΓ τῆς ΑΒ·
ἐλάσσων γὰρ
ἂν ἦν καὶ γωνία ἡ ὑπὸ ΑΒΓ
τῆς ὑπὸ ΑΓΒ·
οὐκ ἔστι δέ·
οὐκ ἄρα ἐλάσσων ἐστὶν ἡ ΑΓ τῆς ΑΒ.
ἐδείχθη δέ, ὅτι
οὐδὲ ἴση ἐστίν.
μείζων ἄρα ἐστὶν ἡ ΑΓ τῆς ΑΒ.

Çünkü değil ise,
ya ΑΓ eşittir ΑΒ kenarına
ya da daha küçüktür;
(ama) ΑΓ eşit değildir ΑΒ kenarına;
çünkü (eğer olsaydı),
ΑΒΓ da eşit olurdu ΑΓΒ açısına;
ama değildir;
dolayısıyla ΑΓ eşit değildir ΑΒ kenarına.
ΑΓ küçük de değildir ΑΒ kenarından;
çünkü (eğer olsaydı),
ΑΒΓ açısı da olurdu (küçük)
ΑΓΒ açısından;
ama değildir;
dolayısıyla ΑΓ küçük değildir ΑΒ kenarından.
Ve gösterilmişti ki
eşit değildir.
Dolayısıyla ΑΓ daha büyüktür ΑΒ kenarından.

Therefore, of any triangle,
under the greater angle
the greater side subtends;
—just what it was necessary to show.

Παντὸς ἄρα τριγώνου
ὑπὸ τὴν μείζονα γωνίαν
ἡ μείζων πλευρὰ ὑποτείνει·
ὅπερ ἔδει δεῖξαι.

Dolayısıyla, herhangi bir üçgende,
daha büyük bir açı,
daha büyük bir kenarca karşılanır;
—gösterilmesi gereken tam buydu.



1.20

Two sides of any triangle
are greater than the remaining one
—taken anyhow.

Παντὸς τριγώνου αἱ δύο πλευραὶ
τῆς λοιπῆς μείζονές εἰσι
πάντῃ μεταλαμβανόμεναι.

Herhangi bir üçgenin iki kenarı
daha büyüktür geriye kalandan
—nasıl seçilirse seçilsin.

For, let there be
a triangle, ΑΒΓ.

Ἔστω γὰρ
τρίγωνον τὸ ΑΒΓ·

Çünkü verilmiş olsun
bir ΑΒΓ üçgeni.

I say that
two sides of triangle ΑΒΓ
are greater than the remaining one,
—taken anyhow,
ΒΑ and ΑΓ, than ΒΓ,
ΑΒ and ΒΓ, than ΑΓ,
ΒΓ and ΓΑ, than ΑΒ.

λέγω, ὅτι
τοῦ ΑΒΓ τριγώνου αἱ δύο πλευραὶ
τῆς λοιπῆς μείζονές εἰσι
πάντῃ μεταλαμβανόμεναι,
αἱ μὲν ΒΑ, ΑΓ τῆς ΒΓ,
αἱ δὲ ΑΒ, ΒΓ τῆς ΑΓ,
αἱ δὲ ΒΓ, ΓΑ τῆς ΑΒ.

İddia ediyorum ki
ΑΒΓ üçgeninin iki kenarı
daha büyüktür geriye kalandan
—nasıl seçilirse seçilsin,
ΒΑ ve ΑΓ, ΒΓ kenarından,
ΑΒ ve ΒΓ, ΑΓ kenarından,
ΒΓ ve ΓΑ, ΑΒ kenarından.

For, suppose has been drawn through
ΒΑ to a point Δ,

Διήχθω γὰρ
ἡ ΒΑ ἐπὶ τὸ Δ σημεῖον,

Çünkü, çizilmiş olsun
ΒΑ kenarı geçerek bir Δ noktasından,

[2] Literally 'was'; but this conditional use of *was* is archaic in English.

and there has been laid down
ΑΔ equal to ΓΑ,
and there has been joined
ΔΓ.

καὶ κείσθω
τῇ ΓΑ ἴση ἡ ΑΔ,
καὶ ἐπεζεύχθω
ἡ ΔΓ.

ve yerleştirilmiş olsun
ΑΔ, ΓΑ kenarına eşit olan,
ve birleştirilmiş olsun
ΔΓ.

Since ΔΑ is equal to ΑΓ,
equal also is
angle ΑΔΓ to ΑΓΔ.
Therefore ΒΓΔ is greater than ΑΔΓ;
also, since there is a triangle, ΔΓΒ,[1]
having angle ΓΒΔ greater
than ΔΒΓ,
and under the greater angle
the greater side subtends,
therefore ΔΒ is greater than ΒΓ.
But ΔΑ is equal to ΑΓ;
therefore ΒΑ and ΑΓ are greater
than ΒΓ;
similarly we shall show that
ΑΒ and ΒΓ than ΓΑ
are greater,
and ΒΓ and ΓΑ than ΑΒ.

Ἐπεὶ οὖν ἴση ἐστὶν ἡ ΔΑ τῇ ΑΓ,
ἴση ἐστὶ καὶ
γωνία ἡ ὑπὸ ΑΔΓ τῇ ὑπὸ ΑΓΔ·
μείζων ἄρα ἡ ὑπὸ ΒΓΔ τῆς ὑπὸ ΑΔΓ·
καὶ ἐπεὶ τρίγωνόν ἐστι τὸ ΔΓΒ
μείζονα ἔχον τὴν ὑπὸ ΒΓΔ γωνίαν
τῆς ὑπὸ ΒΔΓ,
ὑπὸ δὲ τὴν μείζονα γωνίαν
ἡ μείζων πλευρὰ ὑποτείνει,
ἡ ΔΒ ἄρα τῆς ΒΓ ἐστι μείζων.
ἴση δὲ ἡ ΔΑ τῇ ΑΓ·
μείζονες ἄρα αἱ ΒΑ, ΑΓ
τῆς ΒΓ·
ὁμοίως δὴ δείξομεν, ὅτι
καὶ αἱ μὲν ΑΒ, ΒΓ τῆς ΓΑ
μείζονές εἰσιν,
αἱ δὲ ΒΓ, ΓΑ τῆς ΑΒ.

ΔΑ eşit olduğundan ΑΓ kenarına,
eşittir ayrıca
ΑΔΓ, ΑΓΔ açısına.
Dolayısıyla ΒΓΔ büyüktür, ΑΔΓ açısından;
yine, ΔΓΒ, bir üçgen olduğundan,
ΒΓΔ daha büyük olan
ΒΔΓ açısından,
daha büyük açı
daha büyük kenarca karşılandışından,
dolayısıyla ΔΒ büyüktür ΒΓ kenarından.
Ama ΔΑ eşittir ΑΓ kenarına;
dolayısıyla ΒΑ ve ΑΓ büyüktürler
ΒΓ kenarından;
benzer şekilde göstereceğiz ki
ΑΒ ve ΒΓ, ΓΑ kenarından
büyüktürler,
ve ΒΓ ve ΓΑ, ΑΒ kenarından.

Therefore two sides of any triangle
are greater than the remaining one
—taken anyhow;
—just what it was necessary to show.

Παντὸς ἄρα τριγώνου αἱ δύο πλευραὶ
τῆς λοιπῆς μείζονές εἰσι
πάντῃ μεταλαμβανόμεναι·
ὅπερ ἔδει δεῖξαι.

Dolayısıyla, herhangi bir üçgenin iki kenarı
daha büyüktür geriye kalandan
—nasıl seçilirse seçilsin;
—gösterilmesi gereken tam buydu.

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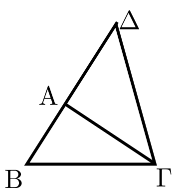


1.21

If, of a triangle,
on one of the sides,
from its extremities,
two STRAIGHTS
be constructed within,[1]
the constructed [STRAIGHTS],
than the remaining two sides of the triangle
will be less,
but will contain the a greater angle.

Ἐὰν τριγώνου
ἐπὶ μιᾶς τῶν πλευρῶν
ἀπὸ τῶν περάτων
δύο εὐθεῖαι
ἐντὸς συσταθῶσιν,
αἱ συσταθεῖσαι
τῶν λοιπῶν τοῦ τριγώνου δύο πλευρῶν
ἐλάττονες μὲν ἔσονται,
μείζονα δὲ γωνίαν περιέξουσιν.

Eğer bir üçgende,
kenarlardan birinin
uçlarından,
iki doğru
içeride inşa edilirse,
inşa edilen doğrular,
üçgenin geriye kalan iki kenarından
daha küçük olacak,
ama daha büyük bir açıyı içerecekler.

For, of a triangle, ΑΒΓ,
on one of the sides, ΒΓ,
from its extremities, Β and Γ,
suppose two STRAIGHTS have been constructed within,
ΒΔ and ΔΓ.

Τριγώνου γὰρ τοῦ ΑΒΓ
ἐπὶ μιᾶς τῶν πλευρῶν τῆς ΒΓ
ἀπὸ τῶν περάτων τῶν Β, Γ
δύο εὐθεῖαι ἐντὸς συνεστάτωσαν
αἱ ΒΔ, ΔΓ·

Çünkü, ΑΒΓ üçgeninin,
bir ΒΓ kenarının
Β ve Γ uçlarından,
içeride iki doğru inşa edilmiş olsun;
ΒΔ ve ΔΓ.

[1]Heath's version is, 'Since *DCB* [ΔΓΒ] is a triangle. . . '

[1]Here the Greek verb, συνίστημι, is the same one used in I.1 for the contruction of a *triangle* on a given straight line. Is it supposed to be obvious to the reader, even *without* a diagram, that now the two constructed straight lines are supposed to meet at a point? See also I.2 and note.

I say that
BΔ and ΔΓ
than the remaining two sides of the triangle,
BA and AΓ,
are less,
but contain a greater angle,
BΔΓ, than BAΓ.

λέγω, ὅτι
αἱ BΔ, ΔΓ
τῶν λοιπῶν τοῦ τριγώνου δύο πλευρῶν
τῶν BA, AΓ
ἐλάσσονες μέν εἰσιν,
μείζονα δὲ γωνίαν περιέχουσι
τὴν ὑπὸ BΔΓ τῆς ὑπὸ BAΓ.

İddia ediyorum ki
BΔ ve ΔΓ
üçgenin geriye kalan iki
BA ve AΓ kenarından,
daha küçütürler,
ama içerirler,
BAΓ açısından daha büyük BΔΓ açısını.

For, let BΔ be drawn through to E.

Διήχθω γὰρ ἡ BΔ ἐπὶ τὸ E.

Çünkü, BΔ çizilmiş olsun E noktasına doğru.

And since, of any triangle,
two sides than the remaining one
are greater,
of the triangle ABE,
the two sides AB and AE
are greater than BE;
suppose has been added in common
EΓ;
therefore BA and AΓ than BE and EΓ
are greater.
Moreover,
since, of the triangle ΓEΔ,
the two sides ΓE and EΔ
are greater than ΓΔ,
suppose has been added in common
ΔB;
therefore ΓE and EB than ΓΔ and ΔB
are greater.
But than BE and EΓ
BA and AΓ were shown greater;
therefore by much
BA and AΓ than BΔ and ΔΓ
are greater.

καὶ ἐπεὶ παντὸς τριγώνου
αἱ δύο πλευραὶ τῆς λοιπῆς
μείζονές εἰσιν,
τοῦ ABE ἄρα τριγώνου
αἱ δύο πλευραὶ αἱ AB, AE
τῆς BE μείζονές εἰσιν·
κοινὴ προσκείσθω
ἡ EΓ·
αἱ ἄρα BA, AΓ τῶν BE, EΓ
μείζονές εἰσιν.
πάλιν,
ἐπεὶ τοῦ ΓEΔ τριγώνου
αἱ δύο πλευραὶ αἱ ΓE, EΔ
τῆς ΓΔ μείζονές εἰσιν,
κοινὴ προσκείσθω
ἡ ΔB·
αἱ ΓE, EB ἄρα τῶν ΓΔ, ΔB
μείζονές εἰσιν.
ἀλλὰ τῶν BE, EΓ
μείζονες ἐδείχθησαν αἱ BA, AΓ·
πολλῷ ἄρα
αἱ BA, AΓ τῶν BΔ, ΔΓ
μείζονές εἰσιν.

Ve herhangi bir üçgenin
iki kenarı, geriye kalandan
büyük olduğundan,
ABE üçgeninin,
iki kenarı, AB ve AE
büyüktür BE kenarından;
ortak olarak eklenmiş olsun
EΓ;
dolayısıyla BA ve AΓ, BE ve EΓ kenarlarından
büyüktürler.
Dahası,
ΓEΔ üçgeninin,
iki kenarları, ΓE ve EΔ
büyüktür ΓΔ kenarından,
ortak olarak eklenmiş olsun
ΔB;
dolayısıyla ΓE ve EB, ΓΔ ve ΔB kenarlarından
büyüktürler.
Ama BE ve EΓ kenarlarından
BA ve AΓ kenarlarının gösterilmişti büyüklüğü;
dolayısıyla çok daha büyüktür
BA ve AΓ, BΔ ve ΔΓ kenarlarından.

Again,
since of any triangle
the external angle
than the interior and opposite angle
is greater,
therefore, of the triangle ΓΔE
the exterior angle BΔΓ
is greater than ΓEΔ.
For the same [reason] again,
of the triangle ABE,
the exterior angle ΓEB
is greater than BAΓ.
But than ΓEB
BΔΓ was shown greater;
therefore by much
BΔΓ is greater than BAΓ.

Πάλιν,
ἐπεὶ παντὸς τριγώνου
ἡ ἐκτὸς γωνία
τῆς ἐντὸς καὶ ἀπεναντίον
μείζων ἐστίν,
τοῦ ΓΔE ἄρα τριγώνου
ἡ ἐκτὸς γωνία ἡ ὑπὸ BΔΓ
μείζων ἐστὶ τῆς ὑπὸ ΓEΔ.
διὰ ταὐτὰ τοίνυν
καὶ τοῦ ABE τριγώνου
ἡ ἐκτὸς γωνία ἡ ὑπὸ ΓEB
μείζων ἐστὶ τῆς ὑπὸ BAΓ.
ἀλλὰ τῆς ὑπὸ ΓEB
μείζων ἐδείχθη ἡ ὑπὸ BΔΓ·
πολλῷ ἄρα
ἡ ὑπὸ BΔΓ μείζων ἐστὶ τῆς ὑπὸ BAΓ.

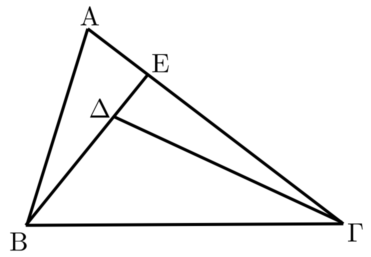
Tekrar,
herhangi bir üçgenin
dış açısı
iç ve karşıt açısından
daha büyüktür,
dolayısıyla, ΓΔE üçgeninin
dış açısı BΔΓ
büyüktür ΓEΔ açısından.
Aynı [sebepten] tekrar,
ABE üçgeninin,
dış açısı ΓEB
büyüktür BAΓ açısından.
Ama ΓEB açısından,
BΔΓ açısının büyüklüğü gösterilmişti;
dolayısıyla çok daha
büyüktür BΔΓ, BAΓ açısından.

If, therefore, of a triangle,
on one of the sides,
from its extremities,
two STRAIGHTS
be constructed within,
the constructed [STRAIGHTS],
than the remaining two sides of the

Ἐὰν ἄρα τριγώνου
ἐπὶ μιᾶς τῶν πλευρῶν
ἀπὸ τῶν περάτων
δύο εὐθεῖαι
ἐντὸς συσταθῶσιν,
αἱ συσταθεῖσαι
τῶν λοιπῶν τοῦ τριγώνου δύο πλευρῶν

Eğer, dolayısıyla, bir üçgenin,
kenarlardan birinin
uçlarından,
iki doğru
içeride inşa edilirse,
inşa edilen doğrular,
üçgenin geriye kalan iki kenarından

triangle will be less, but will contain the a greater angle; —just what it was necessary to show.	ἐλάττονες μέν εἰσιν, μείζονα δὲ γωνίαν περιέχουσιν· ὅπερ ἔδει δεῖξαι.	daha küçük olacak, ama daha büyük bir açıyı içerecekler; —gösterilmesi gereken tam buydu.



1.22

From three STRAIGHTS, which are equal to three given [STRAIGHTS], a triangle to be constructed; and it is necessary for two than the remaining one to be greater [because of any triangle, two sides are[1] greater than the remaining one taken anyhow].	Ἐκ τριῶν εὐθειῶν, αἵ εἰσιν ἴσαι τρισὶ ταῖς δοθείσαις [εὐθείαις], τρίγωνον συστήσασθαι· δεῖ δὲ[2] τὰς δύο τῆς λοιπῆς μείζονας εἶναι πάντῃ μεταλαμβανομένας [διὰ τὸ καὶ παντὸς τριγώνου τὰς δύο πλευρὰς τῆς λοιπῆς μείζονας εἶναι πάντῃ μεταλαμβανομένας].	Üç doğrudan, eşit olan verilmiş üç doğruya, bir üçgen oluşturulması; ve gereklidir ikisinin, kalandan daha büyük olması (çünkü herhangi bir üçgenin, iki kenarı büyüktür geriye kalandan nasıl seçilirse seçilsin).
Let be the given three STRAIGHTS A, B, and Γ, of which two than the remaining one are greater, taken anyhow, A and B than Γ, A and Γ than B, and B and Γ than A.	Ἔστωσαν αἱ δοθεῖσαι τρεῖς εὐθεῖαι αἱ Α, Β, Γ, ὧν αἱ δύο τῆς λοιπῆς μείζονες ἔστωσαν πάντῃ μεταλαμβανόμεναι, αἱ μὲν Α, Β τῆς Γ, αἱ δὲ Α, Γ τῆς Β, καὶ ἔτι αἱ Β, Γ τῆς Α·	Verilmiş olsun üç doğru A, B, ve Γ, ikisi, kalandan büyük olan, nasıl seçilirse seçilsin, A ile B, Γ kenarından, A ile Γ, B kenarından, ve B ile Γ, A kenarından.
Is is necessary from equals to A, B, and Γ for a triangle to be constructed.	δεῖ δὴ ἐκ τῶν ἴσων ταῖς Α, Β, Γ τρίγωνον συστήσασθαι.	Gereklidir A, B ve Γ doğrularına eşit olanlardan bir üçgenin inşa edilmesi.
Suppose there is laid out some straight line, ΔE, bounded at Δ, but unbounded at E, and there is laid down ΔZ equal to A, ZH equal to B, and HΘ equal to Γ; and to center Z at distance ZΔ a circle has been drawn, ΔKΛ; moreover, to center H, at distance HΘ, circle KΛΘ has been drawn,	Ἐκκείσθω τις εὐθεῖα ἡ ΔΕ πεπερασμένη μὲν κατὰ τὸ Δ ἄπειρος δὲ κατὰ τὸ Ε, καὶ κείσθω τῇ μὲν Α ἴση ἡ ΔΖ, τῇ δὲ Β ἴση ἡ ΖΗ, τῇ δὲ Γ ἴση ἡ ΗΘ· καὶ κέντρῳ μὲν τῷ Ζ, διαστήματι δὲ τῷ ΖΔ κύκλος γεγράφθω ὁ ΔΚΛ· πάλιν κέντρῳ μὲν τῷ Η, διαστήματι δὲ τῷ ΗΘ κύκλος γεγράφθω ὁ ΚΛΘ,	Yerleştirilmiş olsun bir ΔE doğrusu, Δ noktasında sınırlanmış, ama E noktasında sınırlandırılmamış, yerleştirilmiş olsun A doğrusuna eşit ΔZ, B doğrusuna eşit ZH, ve Γ doğrusuna eşit HΘ ; ve Z merkezine ZΔ uzaklığında bir ΔKΛ çemberi çizilmiş olsun; dahası, H merkezine, HΘ uzaklığında, KΛΘ çemberi çizilmiş olsun,

[1] In the Greek this is the infinitive εἶναι 'to be', as in the previous clause.

[2] According to Heiberg, the manuscripts have δεῖ δή here, as at the beginnings of specifications (see §); but Proclus and Eutocius have δεῖ δέ in their commentaries.

and KZ and KH have been joined.

καὶ ἐπεζεύχθωσαν αἱ ΚΖ, ΚΗ·

ve KZ ile KH birleştirilmiş olsun.

I say that
from three STRAIGHTS
equal to A, B, and Γ,
a triangle has been constructed, KZH.

λέγω, ὅτι
ἐκ τριῶν εὐθειῶν
τῶν ἴσων ταῖς Α, Β, Γ
τρίγωνον συνέσταται τὸ ΚΖΗ.

İddia ediyorum ki
üç doğrudan
A, B ve Γ doğrularına eşit olan
bir KZH üçgeni inşa edilmiştir.

For, since the point Z
is the center of circle ΔKΛ,
ZΔ is equal to ZK;
but ZΔ is equal to A.
And KZ is therefore equal to A.
Moreover,
since the point H
is the center of circle ΛKΘ,
HΘ is equal to HK;
but HΘ is equal to Γ;
and KH is therefore equal to Γ.
and ZH is equal to B;
therefore the three STRAIGHTS,
KZ, ZH, and HK
are equal to the three, A, B, and Γ.

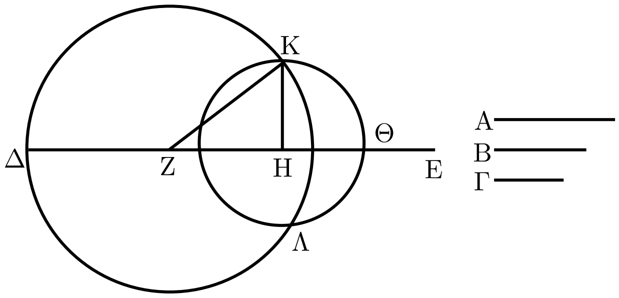
Ἐπεὶ γὰρ τὸ Ζ σημεῖον
κέντρον ἐστὶ τοῦ ΔΚΛ κύκλου,
ἴση ἐστὶν ἡ ΖΔ τῇ ΖΚ·
ἀλλὰ ἡ ΖΔ τῇ Α ἐστιν ἴση.
καὶ ἡ ΚΖ ἄρα τῇ Α ἐστιν ἴση.
πάλιν,
ἐπεὶ τὸ Η σημεῖον
κέντρον ἐστὶ τοῦ ΛΚΘ κύκλου,
ἴση ἐστὶν ἡ ΗΘ τῇ ΗΚ·
ἀλλὰ ἡ ΗΘ τῇ Γ ἐστιν ἴση·
καὶ ἡ ΚΗ ἄρα τῇ Γ ἐστιν ἴση.
ἐστὶ δὲ καὶ ἡ ΖΗ τῇ Β ἴση·
αἱ τρεῖς ἄρα εὐθεῖαι
αἱ ΚΖ, ΖΗ, ΗΚ
τρισὶ ταῖς Α, Β, Γ ἴσαι εἰσίν.

Çünkü merkezi olduğundan Z noktası,
ΔKΛ çemberinin,
ZΔ eşittir ZK doğrusuna;
ama ZΔ eşittir A doğrusuna.
Ve KZ dolayısıyla A doğrusuna eşittir.
Dahası,
merkezi olduğundan H noktası
ΛKΘ çemberinin,
HΘ eşittir HK doğrusuna;
ama HΘ eşittir Γ doğrusuna;
ve KH dolayısıyla Γ doğrusuna eşittir.
ve ZH eşittir B doğrusuna;
dolayısıyla üç doğru,
KZ, ZH ve HK
eşittirler A, B ve Γ üçlüsüne.

Therefore, from the three STRAIGHTS
KZ, ZH, and HK,
which are equal
to the three given STRAIGHTS
A, B, and Γ,
a triangle has been constructed, KZH;
—just what it was necessary to show.

Ἐκ τριῶν ἄρα εὐθειῶν
τῶν ΚΖ, ΖΗ, ΗΚ,
αἵ εἰσιν ἴσαι
τρισὶ ταῖς δοθείσαις εὐθείαις
ταῖς Α, Β, Γ,
τρίγωνον συνέσταται τὸ ΚΖΗ·
ὅπερ ἔδει ποιῆσαι.

Dolayısıyla, üç doğrudan;
KZ, ZH ve HK,
eşit olan
verilmiş üç doğruya
A, B ve Γ,
bir KZH üçgeni inşa edilmiştir;
—gösterilmesi gereken tam buydu.



1.23

At the given STRAIGHT,
and at the given point on it,
equal to the given rectilineal angle,
a rectilineal angle to be constructed.

Πρὸς τῇ δοθείσῃ εὐθείᾳ
καὶ τῷ πρὸς αὐτῇ σημείῳ
τῇ δοθείσῃ γωνίᾳ εὐθυγράμμῳ ἴσην
γωνίαν εὐθύγραμμον συστήσασθαι.

Verilmiş bir doğruda,
ve üzerinde verilmiş noktada,
verilmiş düzkenar açıya eşit olan,
bir düzkenar açı inşa edilmesi.

Let be
the given STRAIGHT AB,
the point on it, A,
the given rectilineal angle,
ΔΓE.

Ἔστω
ἡ μὲν δοθεῖσα εὐθεῖα ἡ ΑΒ,
τὸ δὲ πρὸς αὐτῇ σημεῖον τὸ Α,
ἡ δὲ δοθεῖσα γωνία εὐθύγραμμος
ἡ ὑπὸ ΔΓΕ·

Verilmiş olsun
AB doğrusu,
üzerindeki A noktası,
verilmiş olsun düzkenar açı,
ΔΓE.

It is necessary then,

δεῖ δὴ

Gereklidir şimdi,

on the given STRAIGHT, AB,
and at the point A on it,
to the given rectilileal angle
ΔΓΕ
equal,
for a rectilineal angle
to be constructed.

πρὸς τῇ δοθείσῃ εὐθείᾳ τῇ ΑΒ
καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ Α
τῇ δοθείσῃ γωνίᾳ εὐθυγράμμῳ
τῇ ὑπὸ ΔΓΕ
ἴσην
γωνίαν εὐθύγραμμον
συστήσασθαι.

verilmiş AB doğrusunda,
ve üzerindeki A noktasında,
verilmiş düzkenar
ΔΓΕ açısına
eşit,
bir düzkenar açının
inşa edilmesi.

Suppose there have been chosen
on either of ΓΔ and ΓΕ
random points Δ and E,
and ΔE has been joined,
and from three STRAIGHTs,
which are equal to the three,
ΓΔ, ΔE, and ΓE,
triangle AZH has been constructed,
so that equal are
ΓΔ to AZ,
ΓE to AH,
and ΔE to ZH.

Εἰλήφθω
ἐφ᾽ ἑκατέρας τῶν ΓΔ, ΓΕ
τυχόντα σημεῖα τὰ Δ, Ε,
καὶ ἐπεζεύχθω ἡ ΔΕ·
καὶ ἐκ τριῶν εὐθειῶν,
αἵ εἰσιν ἴσαι τρισὶ
ταῖς ΓΔ, ΔΕ, ΓΕ,
τρίγωνον συνεστάτω τὸ ΑΖΗ,
ὥστε ἴσην εἶναι
τὴν μὲν ΓΔ τῇ ΑΖ,
τὴν δὲ ΓΕ τῇ ΑΗ,
καὶ ἔτι τὴν ΔΕ τῇ ΖΗ.

Seçilmiş olsun
ΓΔ ve ΓE doğrularının her birinden
rastgele Δ ve E noktaları,
ve ΔE birleştirilmiş olsun,
ve üç doğrudan,
eşit olan verilmiş üç
ΓΔ, ΔE ve ΓE doğrularına,
bir AZH üçgen inşa edilmiş olsun
öyle ki, eşit olsun
ΓΔ, AZ doğrusuna,
ΓE, AH doğrusuna, ve ΔE, ZH doğrusuna.

Since then the two, ΔΓ and ΓE,
are equal to the two, ZA and AH,
either to either,
and the base ΔE to the base ZH
is equal,
therefore the angle ΔΓE
is equal to ZAH.

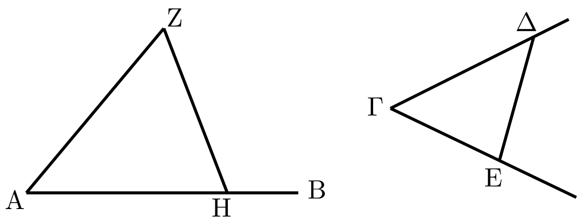
Ἐπεὶ οὖν δύο αἱ ΔΓ, ΓΕ
δύο ταῖς ΖΑ, ΑΗ ἴσαι εἰσὶν
ἑκατέρα ἑκατέρᾳ,
καὶ βάσις ἡ ΔΕ βάσει τῇ ΖΗ
ἴση,
γωνία ἄρα ἡ ὑπὸ ΔΓΕ γωνίᾳ
τῇ ὑπὸ ΖΑΗ ἐστιν ἴση.

O zaman ΔΓ ve ΓE ikilisi,
eşit olduğundan ZA ve AH ikilisinin,
her biri birine,
ve ΔE tabanı, ZH tabanına
eşit,
dolayısıyla ΔΓE açısı
eşittir ZAH açısına.

Therefore, on the given STRAIGHT, AB,
and at the point A on it,
equal to the given rectilineal angle, ΔΓE,
the rectilineal angle ZAH has been constructed;
—just what it was necessary to do.

Πρὸς ἄρα τῇ δοθείσῃ εὐθείᾳ
τῇ ΑΒ
καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ Α τῇ
δοθείσῃ γωνίᾳ εὐθυγράμμῳ τῇ ὑπὸ ΔΓΕ ἴσῃ
γωνία εὐθύγραμμος συνέσταται ἡ ὑπὸ ΖΑΗ·
ὅπερ ἔδει ποιῆσαι.

Dolayısıyla,
AB doğrusunda,
ve üzerindeki A noktasında,
verilen düzkenar ΔΓE açısına eşit,
ZAH düzkenar açısı inşa edilmiştir;
—yapılması gereken tam buydu.



1.24

If two triangles
two sides
to two sides
have equal
either to either,
but angle
than angle
have greater,
[namely] that by the equal sides
contained,
also base
than base
they will have greater.

Ἐὰν δύο τρίγωνα
τὰς δύο πλευρὰς
[ταῖς] δύο πλευραῖς
ἴσας ἔχῃ
ἑκατέραν ἑκατέρᾳ,
τὴν δὲ γωνίαν
τῆς γωνίας
μείζονα ἔχῃ
τὴν ὑπὸ τῶν ἴσων εὐθειῶν
περιεχομένην,
καὶ τὴν βάσιν
τῆς βάσεως
μείζονα ἕξει.

Eğer iki üçgenin
(birinin) iki kenarı
(diğerinin) iki kenarına
eşitse,
her biri birine,
ama açısı
açısından
büyükse,
[yani] eşit kenarlarca
içerilen(ler),
tabanı da
tabanından
büyük olacak.

Let there be
two triangles, ΑΒΓ and ΔΕΖ,
—two sides, ΑΒ and ΑΓ,
to two sides, ΔΕ and ΔΖ,
having equal,
either to either,
ΑΒ to ΔΕ,
and ΑΓ to ΔΖ,
—and the angle at Α,
than the angle at Δ,
let it be greater.

Ἔστω
δύο τρίγωνα τὰ ΑΒΓ, ΔΕΖ
τὰς δύο πλευρὰς τὰς ΑΒ, ΑΓ
ταῖς δύο πλευραῖς ταῖς ΔΕ, ΔΖ
ἴσας ἔχοντα
ἑκατέραν ἑκατέρᾳ,
τὴν μὲν ΑΒ τῇ ΔΕ
τὴν δὲ ΑΓ τῇ ΔΖ,
ἡ δὲ πρὸς τῷ Α γωνία
τῆς πρὸς τῷ Δ γωνίας
μείζων ἔστω·

Verilmiş olsun
iki ΑΒΓ ve ΔΕΖ üçgeni,
— iki ΑΒ ve ΑΓ kenarı,
iki ΔΕ ve ΔΖ kenarına,
eşit olan,
her biri birine,
ΑΒ, ΔΕ kenarına,
ve ΑΓ, ΔΖ kenarına,
—ve Α noktasındaki açısı,
Δ doktasındakinden,
büyük olsun.

I say that
also the base ΒΓ
than the base ΕΖ
is greater.

λέγω, ὅτι
καὶ βάσις ἡ ΒΓ
βάσεως τῆς ΕΖ
μείζων ἐστίν.

İddia ediyorum ki
ΒΓ tabanı da
ΕΖ tabanından
büyüktür.

For since [it] is greater,
[namely] angle ΒΑΓ
than angle ΕΔΖ,
suppose has been constructed
on the STRAIGHT, ΔΕ,
and at the point Δ on it,
equal to angle ΒΑΓ,
ΕΔΗ,
and suppose is laid down,
to either of ΑΓ and ΔΖ equal,
ΔΗ,
and suppose have been joined
ΕΗ and ΖΗ.

Ἐπεὶ γὰρ μείζων
ἡ ὑπὸ ΒΑΓ γωνία
τῆς ὑπὸ ΕΔΖ γωνίας,
συνεστάτω
πρὸς τῇ ΔΕ εὐθείᾳ
καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ Δ
τῇ ὑπὸ ΒΑΓ γωνίᾳ ἴση
ἡ ὑπὸ ΕΔΗ,
καὶ κείσθω
ὁποτέρᾳ τῶν ΑΓ, ΔΖ ἴση
ἡ ΔΗ,
καὶ ἐπεζεύχθωσαν
αἱ ΕΗ, ΖΗ.

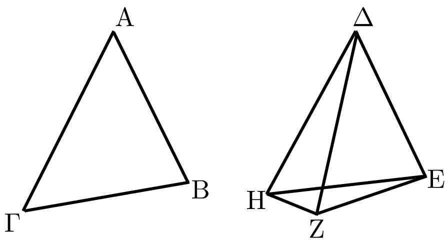
Çünkü büyük olduğundan,
ΒΑΓ açısı
ΕΔΖ açısından,
inşa edilmiş olsun
ΔΕ doğrusunda,
ve üzerindeki Δ noktasında,
ΒΑΓ açısına eşit,
ΕΔΗ,
ve yerleştirilmiş olsun
ΑΓ ve ΔΖ kenarlarının ikisine de eşit,
ΔΗ,
ve birleştirilmiş olsun
ΕΗ ve ΖΗ.

Since [it] is equal,
ΑΒ to ΔΕ,
and ΑΓ to ΔΗ,
the two, ΒΑ and ΑΓ,
to the two, ΕΔ and ΔΗ,
are equal,
either to either;
and angle ΒΑΓ
to angle ΕΔΗ is equal;
therefore the base ΒΓ
to the base ΕΗ is equal.
Moreover,
since [it] is equal,
[namely] ΔΖ to ΔΗ,
[it] too is equal,
[namely] angle ΔΗΖ to ΔΖΗ;
therefore [it] is greater,
[namely] ΔΖΗ than ΕΗΖ;
therefore [it] is much greater,
[namely] ΕΖΗ than ΕΗΖ.
And since there is a triangle, ΕΖΗ,
having greater
angle ΕΖΗ than ΕΗΖ,
and the greater angle,
—the greater side subtends it;
greater therefore also is
side ΕΗ than ΕΖ.
And [it] is equal, ΕΗ to ΒΓ;
greater therefore is ΒΓ than ΕΖ.

Ἐπεὶ οὖν ἴση ἐστὶν
ἡ μὲν ΑΒ τῇ ΔΕ,
ἡ δὲ ΑΓ τῇ ΔΗ,
δύο δὴ αἱ ΒΑ, ΑΓ
δυσὶ ταῖς ΕΔ, ΔΗ
ἴσαι εἰσὶν
ἑκατέρα ἑκατέρᾳ·
καὶ γωνία ἡ ὑπὸ ΒΑΓ
γωνίᾳ τῇ ὑπὸ ΕΔΗ ἴση·
βάσις ἄρα ἡ ΒΓ
βάσει τῇ ΕΗ ἐστιν ἴση.
πάλιν,
ἐπεὶ ἴση ἐστὶν
ἡ ΔΖ τῇ ΔΗ,
ἴση ἐστὶ καὶ
ἡ ὑπὸ ΔΗΖ γωνία τῇ ὑπὸ ΔΖΗ·
μείζων ἄρα
ἡ ὑπὸ ΔΖΗ τῆς ὑπὸ ΕΗΖ·
πολλῷ ἄρα μείζων ἐστὶν
ἡ ὑπὸ ΕΖΗ τῆς ὑπὸ ΕΗΖ.
καὶ ἐπεὶ τρίγωνόν ἐστι τὸ ΕΖΗ
μείζονα ἔχον
τὴν ὑπὸ ΕΖΗ γωνίαν τῆς ὑπὸ ΕΗΖ,
ὑπὸ δὲ τὴν μείζονα γωνίαν
ἡ μείζων πλευρὰ ὑποτείνει,
μείζων ἄρα καὶ
πλευρὰ ἡ ΕΗ τῆς ΕΖ.
ἴση δὲ ἡ ΕΗ τῇ ΒΓ·
μείζων ἄρα καὶ ἡ ΒΓ τῆς ΕΖ.

Eşit olduğundan,
ΑΒ, ΔΕ kenarına,
ve ΑΓ, ΔΗ kenarına,
ΒΑ ve ΑΓ ikilisi,
ΕΔ ve ΔΗ iklisine,
eşittirler,
her biri birine;
ve ΒΑΓ açısı
ΕΔΗ açısına eşittir;
dolayısıyla ΒΓ tabanı
ΕΗ tabanına eşittir.
Dahası,
eşit olduğundan,
ΔΖ, ΔΗ kenarına,
yine eşittir,
ΔΗΖ açısı, ΔΖΗ açısına;
dolayısıyla büyüktür
ΔΖΗ, ΕΗΖ açısından;
dolayısıyla çok daha büyüktür
ΕΖΗ, ΕΗΖ açısından.
Ve ΕΖΗ bir üçgen olduğundan,
büyük olan
ΕΖΗ açısı ΕΗΖ açısından,
ve daha büyük açı,
—daha büyük açı tarafından karşılandığından;
büyüktür dolayısıyla
ΕΗ kenarı da ΕΖ kenarından.
Ve eşittir, ΕΗ , ΒΓ kenarına;
büyüktür dolayısıyla ΒΓ, ΕΖ kenarından.

If, therefore, two triangles	Ἐὰν ἄρα δύο τρίγωνα	Eğer, dolayısıyla, iki üçgenin
two sides	τὰς δύο πλευρὰς	(birinin) iki kenarı
to two sides	δυσὶ πλευραῖς	(diğerinin) iki kenarına
have equal,	ἴσας ἔχῃ	eşitse
either to either,	ἑκατέραν ἑκατέρᾳ,	her biri birine,
but angle	τὴν δὲ γωνίαν	ama açısı
than angle	τῆς γωνίας	açısından
have greater,	μείζονα ἔχῃ	büyükse,
[namely] that by the equal sides	τὴν ὑπὸ τῶν ἴσων εὐθειῶν	[yani] eşit kenarlarca
contained,	περιεχομένην,	içerilen(ler),
also base	καὶ τὴν βάσιν	tabanı da
than base	τῆς βάσεως	tabanından
they will have greater;	μείζονα ἕξει·	büyük olacak;
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	—gösterilmesi gereken tam buydu.

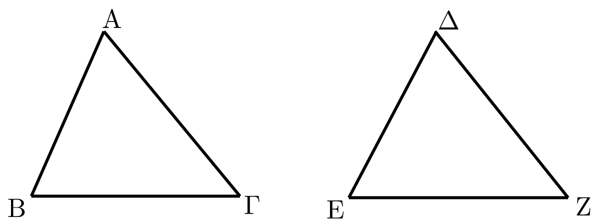


1.25

If two triangles	Ἐὰν δύο τρίγωνα	Eğer iki üçgenin
two sides	τὰς δύο πλευρὰς	(birinin) iki kenarı
to two sides	δυσὶ πλευραῖς	(diğerinin) iki kenarına
have equal,	ἴσας ἔχῃ	eşitse
either to either,	ἑκατέραν ἑκατέρᾳ,	her biri birine,
but base	τὴν δὲ βάσιν	ama tabanı
than base	τῆς βάσεως	tabanından
have greater,	μείζονα ἔχῃ,	büyükse,
also angle	καὶ τὴν γωνίαν	açısı da
than angle	τῆς γωνίας	açısından
they will have greater	μείζονα ἕξει	büyük olacak
—that by the equal STRAIGHTS	τὴν ὑπὸ τῶν ἴσων εὐθειῶν	—(yani) eşit doğrularca
contained.	περιεχομένην.	içerilenler.
Let there be	Ἔστω	Verilmiş olsun
two triangles, ΑΒΓ and ΔΕΖ,	δύο τρίγωνα τὰ ΑΒΓ, ΔΕΖ	ΑΒΓ ve ΔΕΖ üçgenleri,
two sides, ΑΒ and ΑΓ,	τὰς δύο πλευρὰς τὰς ΑΒ, ΑΓ	iki ΑΒ ve ΑΓ kenarı,
to two sides, ΔΕ and ΔΖ,	ταῖς δύο πλευραῖς ταῖς ΔΕ, ΔΖ	iki ΔΕ ve ΔΖ kenarına,
having equal,	ἴσας ἔχοντα	eşit olan,
either to either,	ἑκατέραν ἑκατέρᾳ,	her biri birine,
ΑΒ to ΔΕ	τὴν μὲν ΑΒ τῇ ΔΕ,	ΑΒ, ΔΕ kenarına
and ΑΓ to ΔΖ;	τὴν δὲ ΑΓ τῇ ΔΖ·	ve ΑΓ, ΔΖ kenarına;
and the base ΒΓ	βάσις δὲ ἡ ΒΓ	ve ΒΓ tabanı
than the base ΕΖ	βάσεως τῆς ΕΖ	ΕΖ tabanından
—let it be greater.	μείζων ἔστω·	—büyük olsun.
I say that	λέγω, ὅτι	İddia ediyorum ki
also the angle ΒΑΓ	καὶ γωνία ἡ ὑπὸ ΒΑΓ	ΒΑΓ açısı da
than the angle ΕΔΖ	γωνίας τῆς ὑπὸ ΕΔΖ	ΕΔΖ açısından
is greater.	μείζων ἐστίν.	büyüktür.
For if not,	Εἰ γὰρ μή,	Çünkü eğer değilse,
[it] is either equal to it, or less;	ἤτοι ἴση ἐστὶν αὐτῇ ἢ ἐλάσσων·	ya ona eşittir, ya da ondan küçük;
but it is not equal	ἴση μὲν οὖν οὐκ ἔστιν	ama eşit değildir
—ΒΑΓ to ΕΔΖ;	ἡ ὑπὸ ΒΑΓ τῇ ὑπὸ ΕΔΖ·	—ΒΑΓ, ΕΔΖ açısına;
for if it is equal,	ἴση γὰρ ἂν ἦν	çünkü eğer eşit ise,
also the base ΒΓ to ΕΖ;	καὶ βάσις ἡ ΒΓ βάσει τῇ ΕΖ·	ΒΓ tabanı da ΕΖ tabanına (eşittir);

but it is not.	οὐκ ἔστι δέ.	ama değil.
Therefore it is not equal,	οὐκ ἄρα ἴση ἐστὶ	Dolayısıyla eşit değildir,
angle ΒΑΓ to ΕΔΖ;	γωνία ἡ ὑπὸ ΒΑΓ τῇ ὑπὸ ΕΔΖ·	ΒΑΓ, ΕΔΖ açısına;
neither is it less,	οὐδὲ μὴν ἐλάσσων ἐστὶν	küçük de değildir,
ΒΑΓ than ΕΔΖ;	ἡ ὑπὸ ΒΑΓ τῆς ὑπὸ ΕΔΖ·	ΒΑΓ, ΕΔΖ açısından;
for if it is less,	ἐλάσσων γὰρ ἂν ἦν	çünkü eğer küçük ise,
also base ΒΓ than ΕΖ;	καὶ βάσις ἡ ΒΓ βάσεως τῆς ΕΖ·	ΒΓ tabanı da ΕΖ tabanından (küçüktür);
but it is not;	οὐκ ἔστι δέ·	
therefore it is not less,	οὐκ ἄρα ἐλάσσων ἐστὶν	ama değil;
ΒΑΓ than angle ΕΔΖ.	ἡ ὑπὸ ΒΑΓ γωνία τῆς ὑπὸ ΕΔΖ.	dolayısıyla küçük değildir,
And it was shown that	ἐδείχθη δέ, ὅτι	ΒΑΓ, ΕΔΖ açısından.
it is not equal;	οὐδὲ ἴση·	Ama gösterilmişti ki
therefore it is greater,	μείζων ἄρα ἐστὶν	eşit değildir;
ΒΑΓ than ΕΔΖ.	ἡ ὑπὸ ΒΑΓ τῆς ὑπὸ ΕΔΖ.	dolayısıyla büyüktür,
		ΒΑΓ, ΕΔΖ açısından.

If, therefore, two triangles	Ἐὰν ἄρα δύο τρίγωνα	Eğer, dolayısıyla, iki üçgenin
two sides	τὰς δύο πλευρὰς	(birinin) iki kenarı
to two sides	δυσὶ πλευραῖς	(diğerinin) iki kenarına
have equal,	ἴσας ἔχῃ	eşitse
either to either,	ἑκατέραν ἑκάτερᾳ,	her biri birine,
but base	τὴν δὲ βασίν	ama tabanı
than base	τῆς βάσεως	tabanından
have greater,	μείζονα ἔχῃ,	büyükse,
also angle	καὶ τὴν γωνίαν	açısı da
than angle	τῆς γωνίας	açısından
they will have greater	μείζονα ἕξει	büyük olacak
—that by the equal STRAIGHTS	τὴν ὑπὸ τῶν ἴσων εὐθειῶν	—(yani) eşit doğrularca
contained	περιεχομένην·	içerilenler;
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	—gösterilmesi gereken tam buydu.



1.26

If two triangles	Ἐὰν δύο τρίγωνα	Eğer iki üçgenin
two angles	τὰς δύο γωνίας	iki açısı
to two angles	δυσὶ γωνίαις	iki açısına
have equal,	ἴσας ἔχῃ	eşitse,
either to either,	ἑκατέραν ἑκατέρᾳ	her biri birine,
and one side	καὶ μίαν πλευρὰν	ve bir kenar
to one side	μιᾷ πλευρᾷ	bir kenara
equal,	ἴσην	eşitse,
either that near the equal sides	ἤτοι τὴν πρὸς ταῖς ἴσαις γωνίαις	ya eşit açıların arasında olan
or that subtending	ἢ τὴν ὑποτείνουσαν	ya da karşılayan
one of the equal sides,	ὑπὸ μίαν τῶν ἴσων γωνιῶν,	eşit açılardan birini,
also the remaining sides	καὶ τὰς λοιπὰς πλευρὰς	kalan kenarları da
to the remaining sides	ταῖς λοιπαῖς πλευραῖς	kalan kenarlarına
they will have equal,	ἴσας ἕξει	eşit olacak,
also the remaining angle	καὶ τὴν λοιπὴν γωνίαν	kalan açıları da
to the remaining angle.	τῇ λοιπῇ γωνίᾳ.	kalan açılarına.

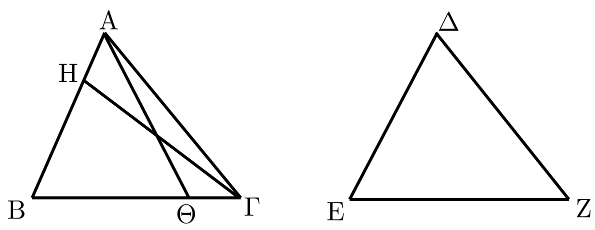
Let there be	Ἔστω	Verilmiş olsun
two triangles, ΑΒΓ and ΔΕΖ	δύο τρίγωνα τὰ ΑΒΓ, ΔΕΖ	iki ΑΒΓ ve ΔΕΖ üçgeni
the two angles ΑΒΓ and ΒΓΑ	τὰς δύο γωνίας τὰς ὑπὸ ΑΒΓ, ΒΓΑ	iki ΑΒΓ ve ΒΓΑ açıları
to the two angles ΔΕΖ and ΕΖΔ	δυσὶ ταῖς ὑπὸ ΔΕΖ, ΕΖΔ	iki ΔΕΖ ve ΕΖΔ açılarına

having equal,	ἴσας ἔχοντα	eşit olan,
either to either,	ἑκατέραν ἑκατέρᾳ,	her biri birine,
ΑΒΓ to ΔΕΖ,	τὴν μὲν ὑπὸ ΑΒΓ τῇ ὑπὸ ΔΕΖ,	ΑΒΓ, ΔΕΖ açısına
and ΒΓΑ to ΕΖΔ;	τὴν δὲ ὑπὸ ΒΓΑ τῇ ὑπὸ ΕΖΔ·	ve ΒΓΑ, ΕΖΔ açısına;
and let them also have	ἐχέτω δὲ	ayrıca olsun
one side	καὶ μίαν πλευρὰν	bir kenarı
to one side	μιᾷ πλευρᾷ	bir kenarına
equal,	ἴσην,	eşit,
first that near the equal angles,	πρότερον τὴν πρὸς ταῖς ἴσαις γωνίαις	önce esit açıların yanında olan,
ΒΓ to ΕΖ;	τὴν ΒΓ τῇ ΕΖ·	ΒΓ, ΕΖ kenarına;
I say that	λέγω, ὅτι	İddia ediyorum ki
the remaining sides	καὶ τὰς λοιπὰς πλευρὰς	kalan kenarlar
to the remaining sides	ταῖς λοιπαῖς πλευραῖς	kalan kenarlara
they will have equal,	ἴσας ἕξει	eşit olacaklar,
either to either,	ἑκατέραν ἑκατέρᾳ,	her biri birine,
ΑΒ to ΔΕ	τὴν μὲν ΑΒ τῇ ΔΕ	ΑΒ, ΔΕ kenarına
and ΑΓ to ΔΖ,	τὴν δὲ ΑΓ τῇ ΔΖ,	ve ΑΓ, ΔΖ kenarına,
also the remaining angle	καὶ τὴν λοιπὴν γωνίαν	ayrıca kalan açı
to the remaining angle,	τῇ λοιπῇ γωνίᾳ,	kalan açıya,
ΒΑΓ to ΕΔΖ.	τὴν ὑπὸ ΒΑΓ τῇ ὑπὸ ΕΔΖ.	ΒΑΓ, ΕΔΖ açısına.
For, if it is unequal,	Εἰ γὰρ ἄνισός ἐστιν	Çünkü, eğer eşit değilse,
ΑΒ to ΔΕ,	ἡ ΑΒ τῇ ΔΕ,	ΑΒ, ΔΕ kenarına,
one of them is greater.	μία αὐτῶν μείζων ἐστίν.	biri daha büyüktür.
Let be greater	ἔστω μείζων	Büyük olan
ΑΒ,	ἡ ΑΒ,	ΑΒ olsun,
and let there be cut	καὶ κείσθω	ve kesilmiş olsun
to ΔΕ equal	τῇ ΔΕ ἴση	ΔΕ kenarina eşit
ΒΗ,	ἡ ΒΗ,	ΒΗ,
and suppose there has been joined	καὶ ἐπεζεύχθω	ve birleştirilmiş olsun
ΗΓ.	ἡ ΗΓ.	ΗΓ.
Because then it is equal,	Ἐπεὶ οὖν ἴση ἐστὶν	Çünkü o zaman eşittir,
ΒΗ to ΔΕ,	ἡ μὲν ΒΗ τῇ ΔΕ,	ΒΗ, ΔΕ kenarına
and ΒΓ to ΕΖ,	ἡ δὲ ΒΓ τῇ ΕΖ,	ve ΒΓ, ΕΖ kenarına,
the two, ΒΗ[1] and ΒΓ	δύο δὴ αἱ ΒΗ, ΒΓ	ΒΗ ve ΒΓ ikilisi
to the two ΔΕ and ΕΖ	δυσὶ ταῖς ΔΕ, ΕΖ	ΔΕ ve ΕΖ ikilisine
are equal,	ἴσαι εἰσὶν	eşittirler,
either to either,	ἑκατέρα ἑκατέρᾳ·	her biri birine,
and the angle ΗΒΓ	καὶ γωνία ἡ ὑπὸ ΗΒΓ	ve ΗΒΓ açısı
to the angle ΔΕΖ	γωνίᾳ τῇ ὑπὸ ΔΕΖ	ΔΕΖ açısına
is equal;	ἴση ἐστίν·	eşittir;
therefore the base ΗΓ	βάσις ἄρα ἡ ΗΓ	dolayısıyla ΗΓ tabanı
to the base ΔΖ	βάσει τῇ ΔΖ	ΔΖ tabanına
is equal,	ἴση ἐστίν,	eşittir,
and the triangle ΗΒΓ	καὶ τὸ ΗΒΓ τρίγωνον	ve ΗΒΓ üçgeni
to the triangle ΔΕΖ	τῷ ΔΕΖ τριγώνῳ	ΔΕΖ üçgenine
is equal,	ἴσον ἐστίν,	eşittir,
and the remaining angles	καὶ αἱ λοιπαὶ γωνίαι	ve kalan açılar
to the remaining angles	ταῖς λοιπαῖς γωνίαις	kalan açılara
will be equal,	ἴσαι ἔσονται,	eşit olacaklar,
those that the equal sides subtend.	ὑφ᾽ ἃς αἱ ἴσαι πλευραὶ ὑποτείνουσιν·	eşit kenarların karşıladıkları.
Equal therefore is angle ΒΓΗ	ἴση ἄρα ἡ ὑπὸ ΗΓΒ γωνία	Eşittir dolayısıyla ΒΓΗ açısı
to ΔΖΕ.	τῇ ὑπὸ ΔΖΕ.	ΔΖΕ açısına.
But ΔΖΕ	ἀλλὰ ἡ ὑπὸ ΔΖΕ	Ama ΔΖΕ,
to ΒΓΑ	τῇ ὑπὸ ΒΓΑ	ΒΓΑ açısına
is supposed equal;	ὑπόκειται ἴση·	eşit kabul edilmişti
therefore also ΒΓΗ	καὶ ἡ ὑπὸ ΒΓΗ ἄρα	dolayısıyla ΒΓΗ de
to ΒΓΑ	τῇ ὑπὸ ΒΓΑ	ΒΓΑ açısına
is equal,	ἴση ἐστίν,	eşittir,
the lesser to the greater,	ἡ ἐλάσσων τῇ μείζονι·	daha küçük olan daha büyük olana,
which is impossible.	ὅπερ ἀδύνατον.	ki bu imkansızdır.

Therefore it is not unequal,	οὐκ ἄρα ἄνισός ἐστιν	Dolayısıyla değildir eşit değil,
AB to ΔE.	ἡ AB τῇ ΔE.	AB, ΔE kenarına.
Therefore it is equal.	ἴση ἄρα.	Dolayısıyla eşittir.
It is also the case that	ἔστι δὲ καὶ	Ayrıca durum şöyledir;
BΓ to EZ is equal;	ἡ BΓ τῇ EZ ἴση·	BΓ, EZ kenarına eşittir;
then the two AB and BΓ	δύο δὴ αἱ AB, BΓ	o zaman AB ve BΓ ikilisi
to the two ΔE and EZ	δυσὶ ταῖς ΔE, EZ	ΔE ve EZ ikilisine
are equal,	ἴσαι εἰσὶν	eşittirler,
either to either;	ἑκατέρα ἑκατέρᾳ·	her biri birine;
also the angle ABΓ	καὶ γωνία ἡ ὑπὸ ABΓ	ABΓ açısı da
to the angle ΔEZ	γωνίᾳ τῇ ὑπὸ ΔEZ	ΔEZ açısına
is equal;	ἐστιν ἴση·	eşittir;
therefore the base AΓ	βάσις ἄρα ἡ AΓ	dolayısıyla AΓ tabanı
to the base ΔZ	βάσει τῇ ΔZ	ΔZ tabanına
is equal,	ἴση ἐστίν,	eşittir,
and the remaining angle BAΓ	καὶ λοιπὴ γωνία ἡ ὑπὸ BAΓ	ve kalan BAΓ açısı
to the remaining angle EΔZ	τῇ λοιπῇ γωνίᾳ τῇ ὑπὸ EΔZ	kalan EΔZ açısına
is equal.	ἴση ἐστίν.	eşittir.
But then again let them be	Ἀλλὰ δὴ πάλιν ἔστωσαν	Ama o zaman, yine olsunlar
—[those angles] equal sides	αἱ ὑπὸ τὰς ἴσας γωνίας πλευραὶ	— kenarlar eşit [açıları]
subtending—	ὑποτείνουσαι	karşılayan—
equal,	ἴσαι,	eşit,
as AB to ΔE;	ὡς ἡ AB τῇ ΔE·	AB, ΔE kenarına gibi;
I say again that	λέγω πάλιν, ὅτι	Yine iddia ediyorum ki
also the remaining sides	καὶ αἱ λοιπαὶ πλευραὶ	kalan kenarlar da
to the remaining sides	ταῖς λοιπαῖς πλευραῖς	kalan kenarlara
will be equal,	ἴσαι ἔσονται,	eşit olacaklar,
AΓ to ΔZ,	ἡ μὲν AΓ τῇ ΔZ,	AΓ, ΔZ kenarına
and BΓ to EZ,	ἡ δὲ BΓ τῇ EZ	ve BΓ, EZ kenarına
and also the remaining angle BAΓ	καὶ ἔτι ἡ λοιπὴ γωνία ἡ ὑπὸ BAΓ	ve kalan BAΓ açısı da
to the remaining angle EΔZ	τῇ λοιπῇ γωνίᾳ τῇ ὑπὸ EΔZ	kalan EΔZ açısına
is equal.	ἴση ἐστίν.	eşittir.
For, if it is unequal,	Εἰ γὰρ ἄνισός ἐστιν	Çünkü, eğer eşit değil ise,
BΓ to EZ,	ἡ BΓ τῇ EZ,	BΓ, EZ kenarına,
one of them is greater.	μία αὐτῶν μείζων ἐστίν.	biri daha büyüktür.
Let be greater,	ἔστω μείζων,	Daha büyük olsun,
if possible,	εἰ δυνατόν,	eğer mümkünse,
BΓ,	ἡ BΓ,	BΓ,
and let there be cut	καὶ κείσθω	ve kesilmiş olsun
to EZ equal	τῇ EZ ἴση	EZ kenarına eşit
BΘ,	ἡ BΘ,	BΘ,
and suppose there has been joined	καὶ ἐπεζεύχθω	ve kabul edilsin birleştirilmiş olduğu
AΘ.	ἡ AΘ.	AΘ kenarının.
Because also it is equal	καὶ ἐπὲι ἴση ἐστὶν	Ayrıca eşit olduğundan
—BΘ to EZ	ἡ μὲν BΘ τῇ EZ	—BΘ, EZ kenarına
and AB to ΔE,	ἡ δὲ AB τῇ ΔE,	ve AB, ΔE kenarına
then the two AB and BΘ	δύο δὴ αἱ AB, BΘ	AB ve BΘ ikilisi
to the two ΔE and EZ	δυσὶ ταῖς ΔE, EZ	ΔE ve EZ ikilisine
are equal,	ἴσαι εἰσὶν	eşittirler,
either to either;	ἑκατέρα ἐκαρέρᾳ·	her biri birine;
and they contain equal angles;	καὶ γωνίας ἴσας περιέχουσιν·	ama içerirler eşit açıları;
therefore the base AΘ	βάσις ἄρα ἡ AΘ	dolayısıyla AΘ tabanı
to the base ΔZ	βάσει τῇ ΔZ	ΔZ tabanına
is equal,	ἴση ἐστίν,	eşittir,
and the triangle ABΘ	καὶ τὸ ABΘ τρίγωνον	ve ABΘ üçgeni
to the triangle ΔEZ	τῷ ΔEZ τριγώνῳ	ΔEZ üçgenine

[1]Fitzpatrick considers this way of denoting the line to be a 'mistake'; apparently he thinks Euclid should (and perhaps did originally) write HB, for parallelism with ΔE. But HB and BH are the same line, and for all we know, Euclid preferred to write BH because it was in alphabetical order. Netz [12, Ch. 2] studies the general Greek mathematical practice of using the letters in different order for the same mathematical object. He concludes that changes in order are made on purpose, though he does not address examples like the present one.

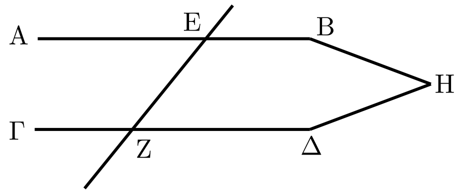
is equal,	ἴσον ἐστίν,	eşittir,
and the remaining angles	καὶ αἱ λοιπαὶ γωνίαι	ve kalan açılar
to the remaining angles	ταῖς λοιπαῖς γωνίαις	kalan açılara
are equal,	ἴσαι ἔσονται,	eşittirler,
which the equal sides	ὑφ᾽ ἃς αἱ ἴσας πλευραὶ	eşit kenarların
subtend.	ὑποτείνουσιν·	karşıladıkları.
Therefore equal is	ἴση ἄρα ἐστὶν	Dolayısıyla eşittir
angle ΒΘΑ	ἡ ὑπὸ ΒΘΑ γωνία	ΒΘΑ,
to ΕΖΔ.	τῇ ὑπὸ ΕΖΔ.	ΕΖΔ açısına.
But ΕΖΔ	ἀλλὰ ἡ ὑπὸ ΕΖΔ	Ama ΕΖΔ,
to ΒΓΑ	τῇ ὑπὸ ΒΓΑ	ΒΓΑ açısına
is equal;	ἐστιν ἴση·	eşittir;
then of triangle ΑΘΓ	τριγώνου δὴ τοῦ ΑΘΓ	o zaman ΑΘΓ üçgeninin
the exterior angle ΒΘΑ	ἡ ἐκτὸς γωνία ἡ ὑπὸ ΒΘΑ	ΒΘΑ dış açısı
is equal	ἴση ἐστὶ	eşittir
to the interior and opposite	τῇ ἐντὸς καὶ ἀπεναντίον	iç ve karşıt
ΒΓΑ;	τῇ ὑπὸ ΒΓΑ·	ΒΓΑ açısına;
which is impossible.	ὅπερ ἀδύνατον.	ki bu imkansızdır.
Therefore it is not unequal,	οὐκ ἄρα ἄνισός ἐστιν	Dolayısıyla eşit değil değildir,
ΒΓ to ΕΖ;	ἡ ΒΓ τῇ ΕΖ·	ΒΓ, ΕΖ kenarına;
therefore it is equal.	ἴση ἄρα.	dolayısıyla eşittir.
And it is also,	ἐστὶ δὲ καὶ	Ve yine
ΑΒ,	ἡ ΑΒ	ΑΒ,
to ΔΕ,	τῇ ΔΕ	ΔΕ kenarına,
equal.	ἴση.	eşittir.
Then the two ΑΒ and ΒΓ	δύο δὴ αἱ ΑΒ, ΒΓ	O zaman ΑΒ ve ΒΓ ikilisi
to the two ΔΕ and ΕΖ	δύο ταῖς ΔΕ, ΕΖ	ΔΕ ve ΕΖ ikilisine
are equal,	ἴσαι εἰσὶν	eşittirler,
either to either;	ἑκατέρα ἑκατέρᾳ·	her biri birine;
and equal angles	καὶ γωνίας ἴσας	eşit açılar
they contain;	περιέχουσι·	içerirler;
therefore the base ΑΓ	βάσις ἄρα ἡ ΑΓ	dolayısıyla ΑΓ tabanı
to the base ΔΖ	βάσει τῇ ΔΖ	ΔΖ tabanına
is equal,	ἴση ἐστίν,	eşittir,
and triangle ΑΒΓ	καὶ τὸ ΑΒΓ τρίγωνον	ve ΑΒΓ üçgeni
to triangle ΔΕΖ	τῷ ΔΕΖ τριγώνῳ	ΔΕΖ üçgenine
is equal,	ἴσον	eşittir,
and the remaining angle ΒΑΓ	καὶ λοιπὴ γωνία ἡ ὑπὸ ΒΑΓ	ve kalan ΒΑΓ açısı
to the remaining angle ΕΔΖ	τῇ λοιπῇ γωνίᾳ τῇ ὑπὸ ΕΔΖ	kalan ΕΔΖ açısına
is equal.	ἴση.	eşittir.
If therefore two triangles	Ἐὰν ἄρα δύο τρίγωνα	Eğer, dolayısıyla, iki üçgenin
two angles	τὰς δύο γωνίας	iki açısı
to two angles	δυσὶ γωνίαις	iki açısına
have equal,	ἴσας ἔχῃ	eşitse,
either to either,	ἑκατέραν ἑκατέρᾳ	her biri birine,
and one side	καὶ μίαν πλευρὰν	ve bir kenar
to one side	μιᾷ πλευρᾷ	bir kenara
equal,	ἴσην	eşitse,
either that near the equal sides	ἤτοι τὴν πρὸς ταῖς ἴσαις γωνίαις,	ya eşit açıların arasında olan
or that subtending	ἢ τὴν ὑποτείνουσαν	ya da karşılayan
one of the equal sides,	ὑπὸ μίαν τῶν ἴσων γωνιῶν,	eşit açılardan birini;
also the remaining sides	καὶ τὰς λοιπὰς πλευρὰς	kalan kenarları da
to the remaining sides	ταῖς λοιπαῖς πλευραῖς	kalan kenarlarına
they will have equal,	ἴσας ἕξει	eşit olacak,
also the remaining angle	καὶ τὴν λοιπὴν γωνίαν	kalan açıları da
to the remaining angle;	τῇ λοιπῇ γωνίᾳ·	kalan açılarına;
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	—gösterilmesi gereken tam buydu.



1.27

If on two STRAIGHTs	Ἐὰν εἰς δύο εὐθείας	Eğer iki doğru üzerine
a STRAIGHT falling	εὐθεῖα ἐμπίπτουσα	düşen bir doğru
the alternate angles	τὰς ἐναλλὰξ γωνίας	ters açıları
equal to one another	ἴσας ἀλλήλαις	birbirine eşit
make,	ποιῇ,	yaparsa
parallel will be to one another	παράλληλοι ἔσονται ἀλλήλαις	birbirine paralel olacak
the STRAIGHTs.	αἱ εὐθεῖαι.	doğrular.
For, on the two STRAIGHTs	Εἰς γὰρ δύο εὐθείας	Çünkü, iki doğru üzerine,
AB and ΓΔ	τὰς AB, ΓΔ	AB ve ΓΔ,
[suppose] the STRAIGHT falling,	εὐθεῖα ἐμπίπτουσα	[kabul edilsin] düşen,
[namely] EZ,	ἡ EZ	EZ doğrusunun,
the alternate angles	τὰς ἐναλλὰξ γωνίας	ters
AEZ and EZΔ	τὰς ὑπὸ AEZ, EZΔ	AEZ ve EZΔ açılarını
equal to one another	ἴσας ἀλλήλαις	birbirine eşit
make.	ποιείτω·	oluşturduğunu.
I say that	λέγω, ὅτι	İddia ediyorum ki
parallel is AB to ΓΔ.	παράλληλός ἐστιν ἡ AB τῇ ΓΔ.	paraleldir AB, ΓΔ doğrusuna.
For if not,	Εἰ γὰρ μή,	Çünkü eğer değilse,
extended,	ἐκβαλλόμεναι	uzatılmış,
AB and ΓΔ will meet,	αἱ AB, ΓΔ συμπεσοῦνται	AB ve ΓΔ buluşacaklar,
either in the B–Δ parts,	ἤτοι ἐπὶ τὰ B, Δ μέρη	ya B–Δ parçalarında,
or in the A–Γ.	ἢ ἐπὶ τὰ A, Γ.	ya da A–Γ parçalarında.
Suppose they have been extended,	ἐκβεβλήσθωσαν	Uzatılmış oldukları kabul edilsin,
and let them meet	καὶ συμπιπτέτωσαν	ve buluşşunlar
in the B–Δ parts	ἐπὶ τὰ B, Δ μέρη	B–Δ parçalarında,
at H.	κατὰ τὸ H.	H noktasında.
Of the triangle HEZ	τριγώνου δὴ τοῦ HEZ	HEZ üçgeninin
the exterior angle AEZ	ἡ ἐκτὸς γωνία ἡ ὑπὸ AEZ	AEZ dış açısı
is equal	ἴση ἐστὶ	eşittir
to the interior and opposite	τῇ ἐντὸς καὶ ἀπεναντίον	iç ve karşıt
EZH;	τῇ ὑπὸ EZH·	EZH aşısına;
which is impossible.	ὅπερ ἐστὶν ἀδύνατον·	ki bu imkansızdır.
Therefore it is not [the case] that	οὐκ ἄρα	Dolayısıyla şöyle değildir (durum)
AB and ΓΔ,	αἱ AB, ΔΓ	AB ve ΓΔ,
extended,	ἐκβαλλόμεναι	uzatılmış,
meet in the B–Δ parts.	συμπεσοῦνται ἐπὶ τὰ B, Δ μέρη.	buluşurlar B–Δ parçalarında.
Similarly it will be shown that	ὁμοίως δὴ δειχθήσεται, ὅτι	Benzer şekilde gösterilecek ki
neither on the A–Γ.	οὐδὲ ἐπὶ τὰ A, Γ·	A–Γ parçalarında da.
Those that in neither parts	αἱ δὲ ἐπὶ μηδέτερα τὰ μέρη	Hiçbir parçada
meet	συμπίπτουσαι	buluşmayanlar
are parallel;	παράλληλοί εἰσιν·	paraleldir;
therefore, parallel is AB to ΓΔ.	παράλληλος ἄρα ἐστὶν ἡ AB τῇ ΓΔ.	dolayısıyla, paraleldir AB, ΓΔ doğrusuna.
If therefore on two STRAIGHTs	Ἐὰν ἄρα εἰς δύο εὐθείας	Eğer, dolayısıyla, iki doğru üzerine
a STRAIGHT falling	εὐθεῖα ἐμπίπτουσα	düşen bir doğru
the alternate angles	τὰς ἐναλλὰξ γωνίας	ters açıları

equal to one another	ἴσας ἀλλήλαις	birbirine eşit
make,	ποιῇ,	yaparsa
parallel will be to one another	παράλληλοι ἔσονται	birbirine paralel olacak
the STRAIGHTS;	αἱ εὐθεῖαι·	doğrular;
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	—gösterilmesi gereken tam buydu.



1.28

If on two STRAIGHTS	Ἐὰν εἰς δύο εὐθείας	Eğer iki doğru üzerine
a STRAIGHT falling[1]	εὐθεῖα ἐμπίπτουσα	düşen bir doğru,
the exterior angle	τὴν ἐκτὸς γωνίαν	dış açıyı,
to the interior and opposite	τῇ ἐντὸς καὶ ἀπεναντίον	iç ve karşıt
and in the same parts	καὶ ἐπὶ τὰ αὐτὰ μέρη	ve aynı tarafta kalan açıya,
make equal,	ἴσην ποιῇ	eşit yaparsa,
or the interior and in the same parts	ἢ τὰς ἐντὸς καὶ ἐπὶ τὰ αὐτὰ μέρη	veya iç ve aynı tarafta kalanları,
to two RIGHTS	δυσὶν ὀρθαῖς	iki dik açıya
equal,	ἴσας,	eşit,
parallel will be to one another	παράλληλοι ἔσονται ἀλλήλαις	birbirine paralel olacak
the STRAIGHTS.	αἱ εὐθεῖαι.	doğrular.

For, on the two STRAIGHTS AB and ΓΔ,	Εἰς γὰρ δύο εὐθείας τὰς AB, ΓΔ	Çünkü, AB ve ΓΔ doğruları üzerine
the STRAIGHT falling—EZ—	εὐθεῖα ἐμπίπτουσα ἡ EZ	düşen EZ doğrusu
the exterior angle EHB	τὴν ἐκτὸς γωνίαν τὴν ὑπὸ EHB	EHB dış açısını
to the interior and opposite angle	τῇ ἐντὸς καὶ ἀπεναντίον γωνίᾳ	iç ve karşıt
HΘΔ	τῇ ὑπὸ HΘΔ	HΘΔ açısına
equal	ἴσην	eşit
—suppose it makes,	ποιείτω	—yaptığı varsayılsın,
or the interior and in the same parts,	ἢ τὰς ἐντὸς καὶ ἐπὶ τὰ αὐτὰ μέρη	veya iç ve aynı tarafta kalan,
BHΘ and HΘΔ,	τὰς ὑπὸ BHΘ, HΘΔ	BHΘ ve HΘΔ açılarının,
to two RIGHTS	δυσὶν ὀρθαῖς	iki dik açıya
equal.	ἴσας·	eşit olduğu.

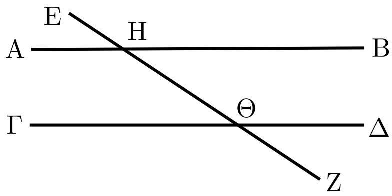
I say that	λέγω, ὅτι	İddia ediyorum ki
parallel is	παράλληλός ἐστιν	paraleldir
AB to ΓΔ.	ἡ AB τῇ ΓΔ.	AB, ΓΔ doğrusuna.

For, since equal is	Ἐπεὶ γὰρ ἴση ἐστὶν	Çünkü, eşit olduğundan
EHB to HΘΔ,	ἡ ὑπὸ EHB τῇ ὑπὸ HΘΔ,	EHB, HΘΔ açısına,
while EHB to AHΘ	ἀλλὰ ἡ ὑπὸ EHB τῇ ὑπὸ AHΘ	aynı zamanda EHB, AHΘ açısına
is equal,	ἐστιν ἴση,	eşitken,
therefore also AHΘ to HΘΔ	καὶ ἡ ὑπὸ AHΘ ἄρα τῇ ὑπὸ HΘΔ	dolayısıyla AHΘ de HΘΔ açısına
is equal;	ἐστιν ἴση·	eşittir;
and they are alternate;	καί εἰσιν ἐναλλάξ·	ve terstirler;
parallel therefore is AB to ΓΔ.	παράλληλος ἄρα ἐστὶν ἡ AB τῇ ΓΔ.	paraleldirler dolayısıyla AB ve ΓΔ.

Alternatively, since BHΘ and HΘΔ	Πάλιν, ἐπεὶ αἱ ὑπὸ BHΘ, HΘΔ	Ya da BHΘ ve HΘΔ,
to two RIGHTS	δύο ὀρθαῖς	iki dik açıya
are equal,	ἴσαι εἰσίν,	eşittirr,
and also are AHΘ and BHΘ	εἰσὶ δὲ καὶ αἱ ὑπὸ AHΘ, BHΘ	ve AHΘ ve BHΘ de
to two RIGHTS	δυσὶν ὀρθαῖς	iki dik açıya

[1] It is perhaps impossible to maintain the Greek word order comprehensibly in English. The normal English order would be, 'If a straight line, falling on two straight lines'. But the proposition is ultimately about the *two* straight lines; perhaps that is why Euclid mentions them before the one straight line that falls on them.

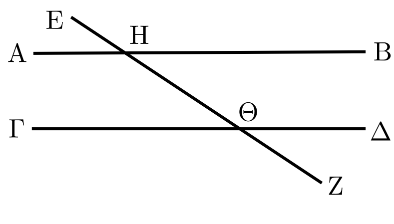
equal,	ἴσαι,	eşittir,
therefore ΑΗΘ and ΒΗΘ	αἱ ἄρα ὑπὸ ΑΗΘ, ΒΗΘ	dolayısıyla ΑΗΘ ve ΒΗΘ,
to ΒΗΘ and ΗΘΔ	ταῖς ὑπὸ ΒΗΘ, ΗΘΔ	ΒΗΘ ve ΗΘΔ açılarına
are equal;	ἴσαι εἰσίν·	eşittirle;
suppose the common has been taken away	κοινὴ ἀφῃρήσθω	varsayılsın çıkartılmış olduğu ortak olan
—ΒΗΘ;	ἡ ὑπὸ ΒΗΘ·	ΒΗΘ açısının;
therefore the remaining ΑΗΘ	λοιπὴ ἄρα ἡ ὑπὸ ΑΗΘ	dolayısıyla ΑΗΘ kalanı
to the remaining ΗΘΔ	λοιπῇ τῇ ὑπὸ ΗΘΔ	ΗΘΔ kalanına
is equal;	ἐστιν ἴση·	eşittir
also they are alternate;	καί εἰσιν ἐναλλάξ·	ve bunlar terstirler;
parallel therefore are ΑΒ and ΓΔ.	παράλληλος ἄρα ἐστὶν ἡ ΑΒ τῇ ΓΔ.	paraleldir dolayısıyla ΑΒ ve ΓΔ.
If therefore on two STRAIGHTS	Ἐὰν ἄρα εἰς δύο εὐθείας	Eğer dolayısıyla iki doğru üzerine
a STRAIGHT falling	εὐθεῖα ἐμπίπτουσα	düşen bir doğru,
the exterior angle	τὴν ἐκτὸς γωνίαν	dış açıyı,
to the interior and opposite	τῇ ἐντὸς καὶ ἀπεναντίον	iç ve karşıt
and in the same parts	καὶ ἐπὶ τὰ αὐτὰ μέρη	ve aynı tarafta kalan açıya,
make equal,	ἴσην ποιῇ	eşit yaparsa,
or the interior and in the same parts	ἢ τὰς ἐντὸς καὶ ἐπὶ τὰ αὐτὰ μέρη	veya iç ve aynı tarafta kalanları,
to two RIGHTS	δυσὶν ὀρθαῖς	iki dik açıya
equal,	ἴσας,	eşit,
parallel will be to one another	παράλληλοι ἔσονται	birbirine paralel olacak
the STRAIGHTS;	αἱ εὐθεῖαι·	doğrular; —gösterilmesi gereken tam buydu.
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	



1.29

The STRAIGHT falling on parallel STRAIGHTS	Ἡ εἰς τὰς παραλλήλους εὐθείας εὐθεῖα ἐμπίπτουσα	Paralel doğrular üzerine düşen bir doğru
the alternate angles	τάς τε ἐναλλὰξ γωνίας	ters açıları
makes equal to one another,	ἴσας ἀλλήλαις ποιεῖ	birbirine eşit yapar,
and the exterior	καὶ τὴν ἐκτὸς	ve dış açıyı
to the interior and opposite	τῇ ἐντὸς καὶ ἀπεναντίον	iç ve karşıt açıya
equal,	ἴσην	eşit,
and the interior and in the same parts	καὶ τὰς ἐντὸς καὶ ἐπὶ τὰ αὐτὰ μέρη	ve iç ve aynı tarafta kalanları
to two RIGHTS equal.	δυσὶν ὀρθαῖς ἴσας.	iki dik açıya eşit.
For, on the parallel STRAIGHTS	Εἰς γὰρ παραλλήλους εὐθείας	Çünkü, paralel
ΑΒ and ΓΔ	τὰς ΑΒ, ΓΔ	ΑΒ ve ΓΔ doğruları üzerine
let the STRAIGHT ΕΖ fall.	εὐθεῖα ἐμπιπτέτω ἡ ΕΖ·	ΕΖ doğrusu düşsün.
I say that	λέγω, ὅτι	İddia ediyorum ki
the alternate angles	τὰς ἐναλλὰξ γωνίας	ters
ΑΗΘ and ΗΘΔ	τὰς ὑπὸ ΑΗΘ, ΗΘΔ	ΑΗΘ ve ΗΘΔ açılarını
equal	ἴσας	eşit
it makes,	ποιεῖ	yapar,
and the exterior angle ΕΗΒ	καὶ τὴν ἐκτὸς γωνίαν τὴν ὑπὸ ΕΗΒ	ve ΕΗΒ dış açısını
to the interior and opposite ΗΘΔ	τῇ ἐντὸς καὶ ἀπεναντίον τῇ ὑπὸ ΗΘΔ	iç ve karşıt ΗΘΔ açısına
equal,	ἴσην	eşit,
and the interior and in the same parts	καὶ τὰς ἐντὸς καὶ ἐπὶ τὰ αὐτὰ μέρη	ve iç ve aynı taraftaki
ΒΗΘ and ΗΘΔ	τὰς ὑπὸ ΒΗΘ, ΗΘΔ	ΒΗΘ ile ΗΘΔ açılarını
to two RIGHTS equal.	δυσὶν ὀρθαῖς ἴσας.	iki dik açıya eşit.

For, if it is unequal,	Εἰ γὰρ ἄνισός ἐστιν	Çünkü, eğer eşit değilse
ΑΗΘ to ΗΘΔ,	ἡ ὑπὸ ΑΗΘ τῇ ὑπὸ ΗΘΔ,	ΑΗΘ, ΗΘΔ açısına,
one of them is greater.	μία αὐτῶν μείζων ἐστίν.	biri büyüktür.
Let the greater be ΑΗΘ;	ἔστω μείζων ἡ ὑπὸ ΑΗΘ·	Büyük olan ΑΗΘ olsun;
let be added in common	κοινὴ προσκείσθω	eklenmiş olsun her ikisine de
ΒΗΘ;	ἡ ὑπὸ ΒΗΘ·	ΒΗΘ;
therefore ΑΗΘ and ΒΗΘ	αἱ ἄρα ὑπὸ ΑΗΘ, ΒΗΘ	dolayısıyla ΑΗΘ ve ΒΗΘ,
than ΒΗΘ and ΗΘΔ	τῶν ὑπὸ ΒΗΘ, ΗΘΔ	ΒΗΘ ve ΗΘΔ açılarından
are greater.	μείζονές εἰσιν.	büyüktürler.
However, ΑΗΘ and ΒΗΘ	ἀλλὰ αἱ ὑπὸ ΑΗΘ, ΒΗΘ	Fakat, ΑΗΘ ve ΒΗΘ
to two rights	δυσὶν ὀρθαῖς	iki dik açıya
equal are.	ἴσαι εἰσίν.	eşittirler.
Therefore [also] ΒΗΘ and ΗΘΔ	[καὶ] αἱ ἄρα ὑπὸ ΒΗΘ, ΗΘΔ	Dolayısıyla ΒΗΘ ve ΗΘΔ [da]
than two rights	δύο ὀρθῶν	iki dik açıdan
less are.	ἐλάσσονές εἰσιν.	küçüktürler.
And [straights] from [angles] that are less	αἱ δὲ ἀπ᾽ ἐλασσόνων	Ve küçük olanlardan,
	ἢ δύο ὀρθῶν	iki dik açıdan,
than two rights,	ἐκβαλλόμεναι	sonsuza uzatılanlar [doğrular],
extended to the infinite,	εἰς ἄπειρον	birbirinin üzerine düşerler.
fall together.	συμπίπτουσιν·	Dolayısıyla ΑΒ ve ΓΔ,
Therefore ΑΒ and ΓΔ,	αἱ ἄρα ΑΒ, ΓΔ	uzatılınca sonsuza,
extended to the infinite,	ἐκβαλλόμεναι εἰς ἄπειρον	birbirinin üzerine düşecekler.
will fall together.	συμπεσοῦνται·	Ama onlar birbirinin üzerine düşmezler,
But they do not fall together,	οὐ συμπίπτουσι δὲ	
by their being assumed parallel.	διὰ τὸ παραλλήλους αὐτὰς ὑποκεῖσθαι·	paralel oldukları kabul edildiğinden.
Therefore is not unequal	οὐκ ἄρα ἄνισός ἐστιν	Dolayısıyla eşit değil değildir
ΑΗΘ to ΗΘΔ.	ἡ ὑπὸ ΑΗΘ τῇ ὑπὸ ΗΘΔ·	ΑΗΘ, ΗΘΔ açısına.
Therefore it is equal.	ἴση ἄρα.	Dolayısıyla eşittir.
However, ΑΗΘ to ΕΗΒ	ἀλλὰ ἡ ὑπὸ ΑΗΘ τῇ ὑπὸ ΕΗΒ	Ancak, ΑΗΘ, ΕΗΒ açısına
is equal;	ἐστιν ἴση·	eşittir;
therefore also ΕΗΒ to ΗΘΔ	καὶ ἡ ὑπὸ ΕΗΒ ἄρα τῇ ὑπὸ ΗΘΔ	dolayısıyla ΕΗΒ da ΗΘΔ açısına
is equal;	ἐστιν ἴση·	eşittir;
let ΒΗΘ be added in common;	κοινὴ προσκείσθω ἡ ὑπὸ ΒΗΘ·	eklenmiş olsun her ikisine de ΒΗΘ;
therefore ΕΗΒ and ΒΗΘ	αἱ ἄρα ὑπὸ ΕΗΒ, ΒΗΘ	dolayısıyla ΕΗΒ ve ΒΗΘ,
to ΒΗΘ and ΗΘΔ	ταῖς ὑπὸ ΒΗΘ, ΗΘΔ	ΒΗΘ ve ΗΘΔ açılarına
is equal.	ἴσαι εἰσίν.	eşittir.
But ΕΗΒ and ΒΗΘ	ἀλλὰ αἱ ὑπὸ ΕΗΒ, ΒΗΘ	Ama ΕΗΒ ve ΒΗΘ
to two rights	δύο ὀρθαῖς	iki dik açıya
are equal.	ἴσαι εἰσίν·	eşittirler.
Therefore also ΒΗΘ and ΗΘΔ	καὶ αἱ ὑπὸ ΒΗΘ, ΗΘΔ ἄρα	Dolayısıyla ΒΗΘ ve ΗΘΔ da
to two rights	δύο ὀρθαῖς	iki dik açıya
are equal.	ἴσαι εἰσίν.	eşittirler.
Therefore the on-parallel-straights straight	Ἡ ἄρα εἰς τὰς παραλλήλους εὐθείας εὐθεῖα	Dolayısıyla paralel doğrular üzerine, doğru
falling	ἐμπίπτουσα	düşerken
the alternate angles	τάς τε ἐναλλὰξ γωνίας	ters açıları
makes equal to one another,	ἴσας ἀλλήλαις ποιεῖ	eşit yapar birbirine,
and the exterior	καὶ τὴν ἐκτὸς	ve dış açıyı
to the interior and opposite	τῇ ἐντὸς καὶ ἀπεναντίον	iç ve karşıta
equal,	ἴσην	eşit,
and the interior and in the same parts	καὶ τὰς ἐντὸς καὶ ἐπὶ τὰ αὐτὰ μέρη	ve iç ve aynı taraftakileri s
to two rights equal;	δυσὶν ὀρθαῖς ἴσας·	iki dik açıya eşit;
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	—gösterilmesi gereken tam buydu.



1.30

[Straights] to the same straight
parallel
also to one another are parallel.

Αἱ τῇ αὐτῇ εὐθείᾳ παράλληλοι
καὶ ἀλλήλαις εἰσὶ παράλληλοι.

Aynı doğruya
paralel doğrular
birbirlerine de paraleldir.

Let be
either of AB and ΓΔ
to ΓΔ parallel.

Ἔστω
ἑκατέρα τῶν ΑΒ, ΓΔ
τῇ ΕΖ παράλληλος·

Olsun
AB ve ΓΔ doğrularının her biri,
ΓΔ doğrusuna paralel.

I say that
also AB to ΓΔ is parallel.

λέγω, ὅτι
καὶ ἡ ΑΒ τῇ ΓΔ ἐστι παράλληλος.

İddia ediyorum ki
AB da ΓΔ doğrusuna paraleldir.

For let fall on them a straight, HK.

Ἐμπιπτέτω γὰρ εἰς αὐτὰς εὐθεῖα ἡ ΗΚ.

Çünkü üzerlerine bir HK doğrusu düşmüş olsun.

Then, since on the parallel straights
AB and EZ
a straight has fallen, [namely] HK,
equal therefore is AHK to HΘZ.
Moreover,
since on the parallel straights
EZ and ΓΔ
a straight has fallen, [namely] HK,
equal is HΘZ to HKΔ.
And it was shown also that
AHK to HΘZ is equal.
Also AHK therefore to HKΔ
is equal;
and they are alternate.
Parallel therefore is AB to ΓΔ.

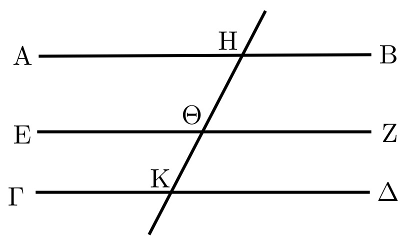
Καὶ ἐπεὶ εἰς παραλλήλους εὐθείας
τὰς ΑΒ, ΕΖ
εὐθεῖα ἐμπέπτωκεν ἡ ΗΚ,
ἴση ἄρα ἡ ὑπὸ ΑΗΚ τῇ ὑπὸ ΗΘΖ.
πάλιν,
ἐπεὶ εἰς παραλλήλους εὐθείας
τὰς ΕΖ, ΓΔ
εὐθεῖα ἐμπέπτωκεν ἡ ΗΚ,
ἴση ἐστὶν ἡ ὑπὸ ΗΘΖ τῇ ὑπὸ ΗΚΔ.
ἐδείχθη δὲ καὶ
ἡ ὑπὸ ΑΗΚ τῇ ὑπὸ ΗΘΖ ἴση.
καὶ ἡ ὑπὸ ΑΗΚ ἄρα τῇ ὑπὸ ΗΚΔ
ἐστιν ἴση·
καί εἰσιν ἐναλλάξ.
παράλληλος ἄρα ἐστὶν ἡ ΑΒ τῇ ΓΔ.

O zaman, paralel
AB ve EZ doğrularının üzerine
bir doğru düşmüş olduğundan, [yani] HK,
eşittir dolayısıyla AHK, HΘZ açısına.
Dahası,
paralel
EZ ve ΓΔ doğrularının üzerine
bir doğru düşmüş olduğundan, [yani] HK,
eşittir HΘZ, HKΔ açısına.
Ve gösterilmişti ki
AHK, HΘZ açısına eşittir.
Ve AHK dolayısıyla HKΔ açısına eşittir;
ve bunlar terstirler.
Paraleldir dolayısıyla AB, ΓΔ doğrusuna.

Therefore [straights]
to the same straight
parallel
also to one another are parallel;
—just what it was necessary to show.

[Αἱ ἄρα
τῇ αὐτῇ εὐθείᾳ
παράλληλοι
καὶ ἀλλήλαις εἰσὶ παράλληλοι·]
ὅπερ ἔδει δεῖξαι.

Dolayısıyla
aynı doğruya paraleller
birbirlerine de paraleldir;
—gösterilmesi gereken tam buydu.



1.31

Through the given point
to the given straight parallel
a straight line to draw.

Διὰ τοῦ δοθέντος σημείου
τῇ δοθείσῃ εὐθείᾳ παράλληλον
εὐθεῖαν γραμμὴν ἀγαγεῖν.

Verilen bir noktadan
verilen bir doğruya paralel
bir doğru çizmek.

Let be
the given point A,
and the given straight BΓ.

Ἔστω
τὸ μὲν δοθὲν σημεῖον τὸ Α,
ἡ δὲ δοθεῖσα εὐθεῖα ἡ ΒΓ·

Olsun
verilen nokta A,
ve verilen doğru BΓ.

It is necessary then

δεῖ δὴ

Şimdi gereklidir

through the point A
to the STRAIGHT BΓ parallel
a straight line to draw.

διὰ τοῦ Α σημείου
τῇ ΒΓ εὐθείᾳ παράλληλον
εὐθεῖαν γραμμὴν ἀγαγεῖν.

A noktasından
BΓ doğrusuna paralel
bir doğru çizmek.

Suppose there has been chosen
on BΓ
a random point Δ,
and there has been joined AΔ.
and there has been constructed,
on the STRAIGHT ΔA,
and at the point A of it,
to the angle AΔΓ equal,
ΔAE;
and suppose there has been extended,
in STRAIGHTs with EA,
the STRAIGHT AZ.

Εἰλήφθω
ἐπὶ τῆς ΒΓ
τυχὸν σημεῖον τὸ Δ,
καὶ ἐπεζεύχθω ἡ ΑΔ·
καὶ συνεστάτω
πρὸς τῇ ΔΑ εὐθείᾳ
καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ Α
τῇ ὑπὸ ΑΔΓ γωνίᾳ ἴση
ἡ ὑπὸ ΔΑΕ·
καὶ ἐκβεβλήσθω
ἐπ᾽ εὐθείας τῇ ΕΑ
εὐθεῖα ἡ ΑΖ.

Varsayılsın seçilmiş olduğu
BΓ üzerinde
rastgele bir Δ noktasının,
ve AΔ doğrusunun birleştirilmiş olduğu,
ve inşa edilmiş olduğu,
ΔA doğrusunda,
ve onun A noktasında,
AΔΓ açısına eşit,
ΔAE açısının;
ve kabul edilsin uzatılmış olsun,
EA ile aynı doğruda,
AZ doğrusu.

And because
on the two STRAIGHTs BΓ and EZ
the straight line falling, AΔ,
the alternate angles
EAΔ and AΔΓ
equal to one another has made,
parallel therefore is EAZ to BΓ.

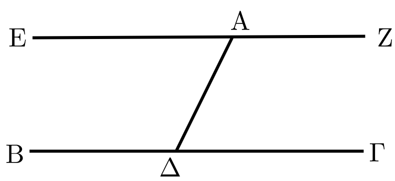
Καὶ ἐπεὶ
εἰς δύο εὐθείας τὰς ΒΓ, ΕΖ
εὐθεῖα ἐμπίπτουσα ἡ ΑΔ
τὰς ἐναλλὰξ γωνίας
τὰς ὑπὸ ΕΑΔ, ΑΔΓ
ἴσας ἀλλήλαις πεποίηκεν,
παράλληλος ἄρα ἐστὶν ἡ ΕΑΖ τῇ ΒΓ.

Ve çünkü
BΓ ve EZ doğruları üzerine
düşerken AΔ doğrusu,
ters
EAΔ ve AΔΓ açılarını
eşit yapmıştır birbirine,
paraleldir dolayısıyla EAZ, BΓ doğrusuna.

Therefore, through the given point A,
to the given STRAIGHT BΓ parallel,
a straight line has been drawn, EAZ;
—just what it was necessary to do.

Διὰ τοῦ δοθέντος ἄρα σημείου τοῦ Α
τῇ δοθείσῃ εὐθείᾳ τῇ ΒΓ παράλληλος
εὐθεῖα γραμμὴ ἦκται ἡ ΕΑΖ·
ὅπερ ἔδει ποιῆσαι.

Dolayısıyla, verilen A noktasından,
verilen BΓ doğrusuna paralel,
bir doğru EAZ, çizilmiş oldu;
—yapılması gereken tam buydu.



1.32

Of any triangle
one of the sides being extended,
the exterior angle
to the two opposite interior angles
is equal,
and the triangle's three interior angles
to two RIGHTs equal are.

Παντὸς τριγώνου
μιᾶς τῶν πλευρῶν προσεκβληθείσης
ἡ ἐκτὸς γωνία
δυσὶ ταῖς ἐντὸς καὶ ἀπεναντίον
ἴση ἐστίν,
καὶ αἱ ἐντὸς τοῦ τριγώνου τρεῖς γωνίαι
δυσὶν ὀρθαῖς ἴσαι εἰσίν.

Herhangi bir üçgenin
kenarlarından biri uzatıldığında,
dış açı
iki karşıt iç açıya
eşittir,
ve üçgenin üç iç açısı
iki dik açıya eşittir.

Let there be
the triangle ABΓ,
and suppose there has been extended
its one side, BΓ, to Δ;

Ἔστω
τρίγωνον τὸ ΑΒΓ,
καὶ προσεκβεβλήσθω
αὐτοῦ μία πλευρὰ ἡ ΒΓ ἐπὶ τὸ Δ·

Verilmiş olsun
ABΓ üçgeni,
ve varsayılsın uzatılmış olduğu
bir BΓ kenarının Δ noktasına.

I say that
the exterior angle AΓ is equal

λέγω, ὅτι
ἡ ἐκτὸς γωνία ἡ ὑπὸ ΑΓΔ ἴση ἐστὶ

İddia ediyorum ki
AΓΔ dış açısı eşittir

to the two interior and opposite angles
ΓAB and ABΓ,
and the triangle's three interior angles
ABΓ, BΓA, and ΓAB
to two RIGHTs equal are.

δυσὶ ταῖς ἐντὸς καὶ ἀπεναντίον
ταῖς ὑπὸ ΓΑΒ, ΑΒΓ,
καὶ αἱ ἐντὸς τοῦ τριγώνου τρεῖς γωνίαι
αἱ ὑπὸ ΑΒΓ, ΒΓΑ, ΓΑΒ
δυσὶν ὀρθαῖς ἴσαι εἰσίν.

iki iç ve karşıt
ΓAB ve ABΓ açısına,
ve üçgenin üç iç açısı
ABΓ, BΓA ve ΓAB,
iki dik açıya eşittir.

For, suppose there has been drawn
through the point Γ
to the STRAIGHT AB parallel
ΓE.

Ἤχθω γὰρ
διὰ τοῦ Γ σημείου
τῇ ΑΒ εὐθείᾳ παράλληλος
ἡ ΓΕ.

Çünkü, varsayılsın çizilmiş olduğu
Γ noktasından
AB doğrusuna paralel
ΓE doğrusunun.

And since parallel is AB to ΓE,
and on these has fallen AΓ,
the alternate angles BAΓ and AΓE
equal to one another are.
Moreover, since parallel is
AB to ΓE,
and on these has fallen
the STRAIGHT BΔ,
the exterior angle EΓΔ is equal
to the interior and opposite ABΓ.
And it was shown that
also AΓE to BAΓ [is] equal.
Therefore the whole angle AΓΔ
is equal
to the two interior and opposite angles
BAΓ and ABΓ.

Καὶ ἐπεὶ παράλληλός ἐστιν ἡ ΑΒ τῇ ΓΕ,
καὶ εἰς αὐτὰς ἐμπέπτωκεν ἡ ΑΓ,
αἱ ἐναλλὰξ γωνίαι αἱ ὑπὸ ΒΑΓ, ΑΓΕ
ἴσαι ἀλλήλαις εἰσίν.
πάλιν, ἐπεὶ παράλληλός ἐστιν
ἡ ΑΒ τῇ ΓΕ,
καὶ εἰς αὐτὰς ἐμπέπτωκεν
εὐθεῖα ἡ ΒΔ,
ἡ ἐκτὸς γωνία ἡ ὑπὸ ΕΓΔ ἴση ἐστὶ
τῇ ἐντὸς καὶ ἀπεναντίον τῇ ὑπὸ ΑΒΓ.
ἐδείχθη δὲ καὶ ἡ ὑπὸ ΑΓΕ τῇ ὑπὸ ΒΑΓ ἴση·
ὅλη ἄρα ἡ ὑπὸ ΑΓΔ γωνία
ἴση ἐστὶ
δυσὶ ταῖς ἐντὸς καὶ ἀπεναντίον
ταῖς ὑπὸ ΒΑΓ, ΑΒΓ.

Ve paralel olduğundan AB, ΓE doğrusuna,
ve bunların üzerine düştüğünden AΓ,
ters BAΓ ve AΓE açıları
eşittirler birbirlerine.
Dahası, paralel olduğundan
AB, ΓE doğrusuna,
and bunların üzerine düştüğünden
BΔ doğrusu,
EΓΔ dış açısı eşittir
iç ve karşıt ABΓ açısına.
Ve gösterilmişti ki
AΓE da BAΓ açısına eşittir.
Dolayısıyla açının tamamı AΓΔ
eşittir
iç ve karşıt
BAΓ ve ABΓ açılarına.

Let be added in common AΓB;
Therefore AΓΔ and AΓB
to the three ABΓ, BΓA, and ΓAB
equal are.
However, AΓΔ and AΓB
to two RIGHTs equal are;
also AΓB, ΓBA, and ΓAB therefore
to two RIGHTs equal are.

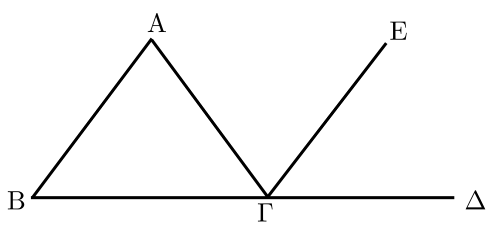
Κοινὴ προσκείσθω ἡ ὑπὸ ΑΓΒ·
αἱ ἄρα ὑπὸ ΑΓΔ, ΑΓΒ
τρισὶ ταῖς ὑπὸ ΑΒΓ, ΒΓΑ, ΓΑΒ
ἴσαι εἰσίν.
ἀλλ᾽ αἱ ὑπὸ ΑΓΔ, ΑΓΒ
δυσὶν ὀρθαῖς ἴσαι εἰσίν·
καὶ αἱ ὑπὸ ΑΓΒ, ΓΒΑ, ΓΑΒ ἄρα
δυσὶν ὀρθαῖς ἴσαι εἰσίν.

Eklenmiş olsun AΓB ortak olarak;
Dolayısıyla AΓΔ ve AΓB açıları
ABΓ, BΓA ve ΓAB üçlüsüne
eşittir.
Fakat, AΓΔ ve AΓB açıları
iki dik açıya eşittir;
AΓB, ΓBA ve ΓAB da dolayısıyla
iki dik açıya eşittir.

Therefore, of any triangle
one of the sides being extended,
the exterior angle
to the two opposite interior angles
is equal,
and the triangle's three interior angles
to two RIGHTs equal are;
—just what it was necessary to show.

Παντὸς ἄρα τριγώνου
μιᾶς τῶν πλευρῶν προσεκβληθείσης
ἡ ἐκτὸς γωνία
δυσὶ ταῖς ἐντὸς καὶ ἀπεναντίον
ἴση ἐστίν,
καὶ αἱ ἐντὸς τοῦ τριγώνου τρεῖς γωνίαι
δυσὶν ὀρθαῖς ἴσαι εἰσίν·
ὅπερ ἔδει δεῖξαι.

Dolayısıyla, herhangi bir üçgenin
kenarlarından biri uzatıldığında,
dış açı
iki karşıt iç açıya
eşittir,
ve üçgenin üç iç açısı
iki dik açıya eşittir;
—gösterilmesi gereken tam buydu.



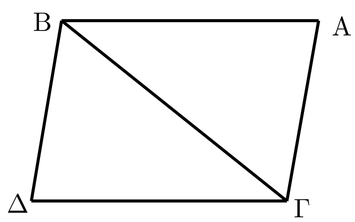
1.33

STRAIGHTs joining equals and parallels to the same parts
also themselves equal and parallel are.

Αἱ τὰς ἴσας τε καὶ παραλλήλους ἐπὶ τὰ αὐτὰ μέρη ἐπιζευγνύουσαι εὐθεῖαι
καὶ αὐταὶ ἴσαι τε καὶ παράλληλοί εἰσιν.

Eşit ve paralellerin aynı taraflarını birleştiren doğruların
kendileri de eşit ve paraleldirler.

Let be equals and parallels AB and ΓΔ, and let join these in the same parts STRAIGHTs ΑΓ and ΒΔ.	Ἔστωσαν ἴσαι τε καὶ παράλληλοι αἱ ΑΒ, ΓΔ, καὶ ἐπιζευγνύτωσαν αὐτὰς ἐπὶ τὰ αὐτὰ μέρη εὐθεῖαι αἱ ΑΓ, ΒΔ·	Olsun eşit ve paraleller AB ve ΓΔ, ve bunların birleştirsin aynı taraflarını ΑΓ ve ΒΔ doğruları.
I say that also ΑΓ and ΒΔ equal and parallel are.	λέγω, ὅτι καὶ αἱ ΑΓ, ΒΔ ἴσαι τε καὶ παράλληλοί εἰσιν.	İddia ediyorum ki ΑΓ ve ΒΔ da eşit ve paraleldirler.
Suppose there has been joined ΒΓ. And since parallel is AB to ΓΔ, and on these has fallen ΒΓ, the alternate angles ΑΒΓ and ΒΓΔ equal to one another are. And since equal is AB to ΓΔ, and common [is] ΒΓ, then the two AB and ΒΓ to the two ΒΓ and ΓΔ equal are; also angle ΑΒΓ to angle ΒΓΔ [is] equal; therefore the base ΑΓ to the base ΒΔ is equal, and the triangle ΑΒΓ to the triangle ΒΓΔ is equal, and the remaining angles to the remaining angles equal will be, either to either, which the equal sides subtend; equal therefore the ΑΓΒ angle to ΓΒΔ. And since on the two STRAIGHTs ΑΓ and ΒΔ the STRAIGHT falling—ΒΓ— alternate angles equal to one another has made, parallel therefore is ΑΓ to ΒΔ. And it was shown to it also equal.	Ἐπεζεύχθω ἡ ΒΓ. καὶ ἐπεὶ παράλληλός ἐστιν ἡ ΑΒ τῇ ΓΔ, καὶ εἰς αὐτὰς ἐμπέπτωκεν ἡ ΒΓ, αἱ ἐναλλὰξ γωνίαι αἱ ὑπὸ ΑΒΓ, ΒΓΔ ἴσαι ἀλλήλαις εἰσίν. καὶ ἐπεὶ ἴση ἐστὶν ἡ ΑΒ τῇ ΓΔ κοινὴ δὲ ἡ ΒΓ, δύο δὴ αἱ ΑΒ, ΒΓ δύο ταῖς ΒΓ, ΓΔ ἴσαι εἰσίν· καὶ γωνία ἡ ὑπὸ ΑΒΓ γωνίᾳ τῇ ὑπὸ ΒΓΔ ἴση· βάσις ἄρα ἡ ΑΓ βάσει τῇ ΒΔ ἐστιν ἴση, καὶ τὸ ΑΒΓ τρίγωνον τῷ ΒΓΔ τριγώνῳ ἴσον ἐστίν, καὶ αἱ λοιπαὶ γωνίαι ταῖς λοιπαῖς γωνίαις ἴσαι ἔσονται ἑκατέρα ἑκατέρᾳ, ὑφ᾽ ἃς αἱ ἴσαι πλευραὶ ὑποτείνουσιν· ἴση ἄρα ἡ ὑπὸ ΑΓΒ γωνία τῇ ὑπὸ ΓΒΔ. καὶ ἐπεὶ εἰς δύο εὐθείας τὰς ΑΓ, ΒΔ εὐθεῖα ἐμπίπτουσα ἡ ΒΓ τὰς ἐναλλὰξ γωνίας ἴσας ἀλλήλαις πεποίηκεν, παράλληλος ἄρα ἐστὶν ἡ ΑΓ τῇ ΒΔ. ἐδείχθη δὲ αὐτῇ καὶ ἴση.	Varsayılsın birleştirilmiş olduğu ΒΓ doğrusunun. Ve paralel olduğundan AB, ΓΔ doğrusuna, ve bunların üzerine düştüğünden ΒΓ, ters ΑΒΓ ve ΒΓΔ açıları birbirlerine eşittirler. Ve eşit olduğundan AB, ΓΔ doğrusuna, ve ΒΓ ortak, AB ve ΒΓ ikilisi ΒΓ ve ΓΔ ikilisine eşittir; ΑΒΓ açısı da ΒΓΔ açısına eşittir; dolayısıyla ΑΓ tabanı ΒΔ tabanına eşittir, ve ΑΒΓ üçgeni ΒΓΔ üçgenine eşittir, ve kalan açılar kalan açılara eşit olacaklar, her biri birine, eşit kenarları görenler; eşittir dolayısıyla ΑΓΒ, ΓΒΔ açısına. Ve üzerine iki ΑΓ ve ΒΔ doğrularının, düşen doğru—ΒΓ— birbirine eşit ters açılar yapmıştır, paraleldir dolayısıyla ΑΓ, ΒΔ doğrusuna. Ve eşit olduğu da gösterilmişti.
Therefore STRAIGHTs joining equals and parallels to the same parts also themselves equal and parallel are. —just what it was necessary to show.	Αἱ ἄρα τὰς ἴσας τε καὶ παραλλήλους ἐπὶ τὰ αὐτὰ μέρη ἐπιζευγνύουσαι εὐθεῖαι καὶ αὐταὶ ἴσαι τε καὶ παράλληλοί εἰσιν· ὅπερ ἔδει δεῖξαι.	Dolayısıyla eşit ve parallelerin aynı taraflarını birleştiren doğruların kendileri de eşit ve paraleldirler; —gösterilmesi gereken tam buydu.



1.34

Of parallelogram areas,
opposite sides and angles
are equal to one another,
and the diameter cuts them in two.

Τῶν παραλληλογράμμων χωρίων
αἱ ἀπεναντίον πλευραί τε καὶ γωνίαι
ἴσαι ἀλλήλαις εἰσίν,
καὶ ἡ διάμετρος αὐτὰ δίχα τέμνει.

Paralelkenar alanların,
karşıt kenar ve açıları
eşittir birbirine,
ve köşegen onları ikiye böler.

Let there be
a parallelogram area
ΑΓΔΒ;
a diameter of it, ΒΓ.

Ἔστω
παραλληλόγραμμον χωρίον
τὸ ΑΓΔΒ,
διάμετρος δὲ αὐτοῦ ἡ ΒΓ·

Verilmiş olsun
bir paralelkenar alan
ΑΓΔΒ;
ve onun bir köşegeni, ΒΓ.

I say that
of the ΑΓΔΒ parallelogram
the opposite sides and angles
equal to one another are,
and the ΒΓ diameter it cuts in two.

λέγω, ὅτι
τοῦ ΑΓΔΒ παραλληλογράμμου
αἱ ἀπεναντίον πλευραί τε καὶ γωνίαι
ἴσαι ἀλλήλαις εἰσίν,
καὶ ἡ ΒΓ διάμετρος αὐτὸ δίχα τέμνει.

iddia ediyorum ki
ΑΓΔΒ paralelkenarının
karşıt kenar ve açıları
eşittir birbirine,
ve ΒΓ köşegeni onu ikiye böler.

For, since parallel is
ΑΒ to ΓΔ,
and on these has fallen
a STRAIGHT, ΒΓ,
the alternate angles ΑΒΓ and ΒΓΔ
equal to one another are.
Moreover, since parallel is
ΑΓ to ΒΔ,
and on these has fallen
ΒΓ,
the alternate angles ΑΓΒ and ΓΒΔ
equal to one another are.
Then two triangles there are,
ΑΒΓ and ΒΓΔ,
the two angles ΑΒΓ and ΒΓΑ
to the two ΒΓΔ and ΓΒΔ
equal having,
either to either,
and one side to one side equal,
that near the equal angles,
their common ΒΓ;
also then the remaining sides
to the remaining sides
equal they will have,
either to either,
and the remaining angle
to the remaining angle;
equal, therefore,
the ΑΒ side to ΓΔ,
and ΑΓ to ΒΔ,
and yet equal is the ΒΑΓ angle
to ΓΔΒ.
And since equal is the ΑΒΓ angle
to ΒΓΔ,
and ΓΒΔ to ΑΓΒ,
therefore the whole ΑΒΔ
to the whole ΑΓΔ
is equal.
And was shown also
ΒΑΓ to ΓΔΒ equal.

Ἐπεὶ γὰρ παράλληλός ἐστιν
ἡ ΑΒ τῇ ΓΔ,
καὶ εἰς αὐτὰς ἐμπέπτωκεν
εὐθεῖα ἡ ΒΓ,
αἱ ἐναλλὰξ γωνίαι αἱ ὑπὸ ΑΒΓ, ΒΓΔ
ἴσαι ἀλλήλαις εἰσίν.
πάλιν ἐπεὶ παράλληλός ἐστιν
ἡ ΑΓ τῇ ΒΔ,
καὶ εἰς αὐτὰς ἐμπέπτωκεν
ἡ ΒΓ,
αἱ ἐναλλὰξ γωνίαι αἱ ὑπὸ ΑΓΒ, ΓΒΔ
ἴσαι ἀλλήλαις εἰσίν.
δύο δὴ τρίγωνά ἐστι
τὰ ΑΒΓ, ΒΓΔ
τὰς δύο γωνίας τὰς ὑπὸ ΑΒΓ, ΒΓΑ
δυσὶ ταῖς ὑπὸ ΒΓΔ, ΓΒΔ
ἴσας ἔχοντα
ἑκατέραν ἑκατέρᾳ
καὶ μίαν πλευρὰν μιᾷ πλευρᾷ ἴσην
τὴν πρὸς ταῖς ἴσαις γωνίαις
κοινὴν αὐτῶν τὴν ΒΓ·
καὶ τὰς λοιπὰς ἄρα πλευρὰς
ταῖς λοιπαῖς
ἴσας ἕξει
ἑκατέραν ἑκατέρᾳ
καὶ τὴν λοιπὴν γωνίαν
τῇ λοιπῇ γωνίᾳ·
ἴση ἄρα
ἡ μὲν ΑΒ πλευρὰ τῇ ΓΔ,
ἡ δὲ ΑΓ τῇ ΒΔ,
καὶ ἔτι ἴση ἐστὶν ἡ ὑπὸ ΒΑΓ γωνία
τῇ ὑπὸ ΓΔΒ.
καὶ ἐπεὶ ἴση ἐστὶν ἡ μὲν ὑπὸ ΑΒΓ γωνία
τῇ ὑπὸ ΒΓΔ,
ἡ δὲ ὑπὸ ΓΒΔ τῇ ὑπὸ ΑΓΒ,
ὅλη ἄρα ἡ ὑπὸ ΑΒΔ
ὅλῃ τῇ ὑπὸ ΑΓΔ
ἐστιν ἴση.
ἐδείχθη δὲ καὶ
ἡ ὑπὸ ΒΑΓ τῇ ὑπὸ ΓΔΒ ἴση.

Çünkü, paralel olduğundan
ΑΒ, ΓΔ doğrusuna,
ve bunların üzerine düştüğünden
bir ΒΓ doğrusu,
ters ΑΒΓ ve ΒΓΔ açıları
eşittir birbirlerine.
Dahası, paralel olduğundan
ΑΓ, ΒΔ doğrusuna,
ve bunların üzerine düştüğünden
ΒΓ,
ters açılar ΑΓΒ ve ΓΒΔ
eşittir birbirlerine.
Şimdi iki üçgen vardır;
ΑΒΓ ve ΒΓΔ,
iki ΑΒΓ ve ΒΓΑ açıları
iki ΒΓΔ ve ΓΒΔ açılarına
eşit olan,
her biri birine,
ve bir kenarı, bir kenarına eşit olan,
eşit açıların yanında olan,
onların ortak ΒΓ kenarı;
o zaman kalan kenarları da
kalan kenarlarına
eşit olacaklar,
her biri birine,
ve kalan açı
kalan açıya;
eşit, dolayısıyla,
ΑΒ kenarı ΓΔ kenarına,
ve ΑΓ, ΒΔ kenarına,
ve eşittir ΒΑΓ açısı
ΓΔΒ açısına.
Ve eşit olduğundan ΑΒΓ,
ΒΓΔ açısına,
ve ΓΒΔ, ΑΓΒ açısına,
dolayısıyla açının tamamı ΑΒΔ,
açının tamamına, ΑΓΔ
eşittir.
Ve gösterilmişti ayrıca
ΒΑΓ ile ΓΔΒ açısının eşitliği.

Therefore, of parallelogram areas,
opposite sides and angles
equal to one another are.

Τῶν ἄρα παραλληλογράμμων χωρίων
αἱ ἀπεναντίον πλευραί τε καὶ γωνίαι
ἴσαι ἀλλήλαις εἰσίν.

Dolayısıyla,paralelkenar alanların,
karşıt kenar ve açıları
eşittir birbirlerine.

I say then that
also the diameter them cuts in two.

Λέγω δή, ὅτι
καὶ ἡ διάμετρος αὐτὰ δίχα τέμνει.

Şimdi iddia ediyorum ki
köşegen de onları ikiye keser.

For, since equal is AB to ΓΔ,
and common [is] ΒΓ,
the two AB and ΒΓ
to the two ΓΔ and ΒΓ
equal are,
either to either;
and angle ΑΒΓ
to angle ΒΓΔ
equal.
Therefore also the base ΑΓ
to the base ΔΒ
equal.
Therefore also the ΑΒΓ triangle
to the ΒΓΔ triangle
is equal.

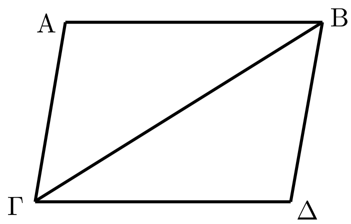
ἐπεὶ γὰρ ἴση ἐστὶν ἡ ΑΒ τῇ ΓΔ,
κοινὴ δὲ ἡ ΒΓ,
δύο δὴ αἱ ΑΒ, ΒΓ
δυσὶ ταῖς ΓΔ, ΒΓ
ἴσαι εἰσὶν
ἑκατέρα ἑκατέρᾳ·
καὶ γωνία ἡ ὑπὸ ΑΒΓ
γωνίᾳ τῇ ὑπὸ ΒΓΔ
ἴση.
καὶ βάσις ἄρα ἡ ΑΓ
τῇ ΔΒ
ἴση.
καὶ τὸ ΑΒΓ [ἄρα] τρίγωνον
τῷ ΒΓΔ τριγώνῳ
ἴσον ἐστίν.

Çünkü, eşit olduğundan AB, ΓΔ kenarına,
ve ΒΓ ortak,
AB ve ΒΓ ikilisi
- ΓΔ ve ΒΓ ikilisine
eşittirler,
her biri birine;
ve ΑΒΓ açısı
ΒΓΔ açısına
eşittir.
Dolayısıyla ΑΓ tabanı da
ΔΒ tabanına
eşittir.
Dolayısıyla ΑΒΓ üçgeni de
ΒΓΔ üçgenine
eşittir.

Therefore the ΒΓ diameter cuts in two
the ΑΒΓΔ parallelogram;
—just what it was necessary to show.

Ἡ ἄρα ΒΓ διάμετρος δίχα τέμνει
τὸ ΑΒΓΔ παραλληλόγραμμον·
ὅπερ ἔδει δεῖξαι.

Dolayısıyla ΒΓ köşegeni ikiye böler
ΑΒΓΔ paralelkenarını;
—gösterilmesi gereken tam buydu.



1.35

Parallelograms
on the same base being
and in the same parallels
equal to one another are.

Τὰ παραλληλόγραμμα
τὰ ἐπὶ τῆς αὐτῆς βάσεως ὄντα
καὶ ἐν ταῖς αὐταῖς παραλλήλοις
ἴσα ἀλλήλοις ἐστίν.

Paralelkenarlar;
aynı tabanda olan
ve aynı paralellerde olanlar,
birbirlerine eşittir.

Let there be
parallelograms
ΑΒΓΔ and ΕΒΓΔ
on the same base, ΓΒ,
and in the same parallels,
ΑΖ and ΒΓ.

Ἔστω
παραλληλόγραμμα
τὰ ΑΒΓΔ, ΕΒΓΖ
ἐπὶ τῆς αὐτῆς βάσεως τῆς ΒΓ
καὶ ἐν ταῖς αὐταῖς παραλλήλοις
ταῖς ΑΖ, ΒΓ·

Verilmiş olsun
paralelkenarlar,
ΑΒΓΔ ve ΕΒΓΔ,
aynı ΓΒ tabanında,
ve aynı
ΑΖ ve ΒΓ paralellerinde.

I say that
equal is
ΑΒΓΔ
to the parallelogram ΕΒΓΖ.

λέγω, ὅτι
ἴσον ἐστὶ
τὸ ΑΒΓΔ
τῷ ΕΒΓΖ παραλληλογράμμῳ.

İddia ediyorum ki
eşittir
ΑΒΓΔ
ΕΒΓΖ paralelkenarına.

For, since
a parallelogram is ΑΒΓΔ,
equal is ΑΔ to ΒΓ.
Similarly then also,
ΕΖ to ΒΓ is equal;
so that also ΑΔ to ΕΖ is equal;
and common [is] ΔΕ;
therefore ΑΕ, as a whole,
to ΔΖ, as a whole,
is equal.

Ἐπεὶ γὰρ
παραλληλόγραμμόν ἐστι τὸ ΑΒΓΔ,
ἴση ἐστὶν ἡ ΑΔ τῇ ΒΓ.
διὰ τὰ αὐτὰ δὴ καὶ
ἡ ΕΖ τῇ ΒΓ ἐστιν ἴση·
ὥστε καὶ ἡ ΑΔ τῇ ΕΖ ἐστιν ἴση·
καὶ κοινὴ ἡ ΔΕ·
ὅλη ἄρα ἡ ΑΕ
ὅλῃ τῇ ΔΖ
ἐστιν ἴση.

Çünkü
bir paralelkenar olduğundan ΑΒΓΔ,
eşittir ΑΔ, ΒΓ kenarına.
Benzer şekilde o zaman,
ΕΖ, ΒΓ kenarına eşittir;
böylece ΑΔ da ΕΖ kenarına eşittir;
ve ortaktır ΔΕ;
dolayısıyla ΑΕ, bir bütün olarak,
ΔΖ kenarına
eşittir.

Is also AB to ΔΓ equal.
Then the two EA and AB
to the two ZΔ and ΔΓ
equal are
either to either;
also angle ZΔΓ
to EAB
is equal,
the exterior to the interior;
therefore the base EB
to the base ZΓ
is equal,
and triangle EAB
to triangle ΔZΓ
equal will be;
suppose has been removed, commonly, ΔHE;
therefore the trapezium ABHΔ that remains
to the trapezium EHΓZ that remains
is equal;
let be added in common
the triangle HBΓ;
therefore the parallelogram ABΓΔ as a whole
to the parallelogram EBΓZ as a whole
is equal.

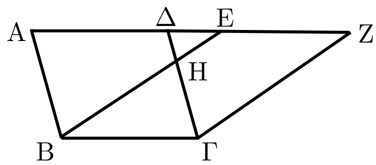
ἔστι δὲ καὶ ἡ AB τῇ ΔΓ ἴση·
δύο δὴ αἱ EA, AB
δύο ταῖς ZΔ, ΔΓ
ἴσαι εἰσὶν
ἑκατέρα ἑκατέρᾳ·
καὶ γωνία ἡ ὑπὸ ZΔΓ
γωνίᾳ τῇ ὑπὸ EAB
ἐστιν ἴση
ἡ ἐκτὸς τῇ ἐντός·
βάσις ἄρα ἡ EB
βάσει τῇ ZΓ
ἴση ἐστίν,
καὶ τὸ EAB τρίγωνον
τῷ ΔZΓ τριγώνῳ
ἴσον ἔσται·
κοινὸν ἀφῃρήσθω τὸ ΔHE·
λοιπὸν ἄρα τὸ ABHΔ τραπέζιον
λοιπῷ τῷ EHΓZ τραπεζίῳ
ἐστὶν ἴσον·
κοινὸν προσκείσθω τὸ HBΓ τρίγωνον·
ὅλον ἄρα τὸ ABΓΔ παραλληλόγραμμον
ὅλῳ τῷ EBΓZ παραλληλογράμμῳ
ἴσον ἐστίν.

AB da ΔΓ kenarına eşittir.
O zaman EA ve AB ikilisi
ZΔ ve ΔΓ ikilisine
eşittirler
her biri birine;
ve ZΔΓ açısı da
EAB açısına
eşittir,
dış açı, iç açıya;
dolayısıyla EB tabanı
ZΓ tabanına
eşittir,
ve EAB üçgeni
ΔZΓ üçgenine
eşit olacak;
kaldırılmış olsun, ortak olarak,
ΔHE;
dolayısıyla kalan ABHΔ yamuğu
kalan EHΓZ yamuğuna
eşittir;
eklenmiş olsun her ikisine birden
HBΓ üçgeni;
dolayısıyla ABΓΔ paralelkenarının tamamı
EBΓZ paralelkenarının tamamına
eşittir.

Therefore parallelograms
on the same base being
and in the same parallels
equal to one another are;
—just what it was necessary to show.

Τὰ ἄρα παραλληλόγραμμα
τὰ ἐπὶ τῆς αὐτῆς βάσεως ὄντα
καὶ ἐν ταῖς αὐταῖς παραλλήλοις
ἴσα ἀλλήλοις ἐστίν·
ὅπερ ἔδει δεῖξαι.

Dolayısısyla paralelkenarlar;
aynı tabanda olan
ve aynı paralellerde olanlar,
birbirlerine eşittir;
—gösterilmesi gereken tam buydu.



1.36

Parallelograms
that are on equal bases
and in the same parallels
are equal to one another.

Τὰ παραλληλόγραμμα
τὰ ἐπὶ ἴσων βάσεων ὄντα
καὶ ἐν ταῖς αὐταῖς παραλλήλοις
ἴσα ἀλλήλοις ἐστίν.

Paralelkenarlar;
eşit tabanlarda olanlar
ve aynı paralellerde olanlar
eşittirler birbirlerine.

Let there be
parallelograms
ABΓΔ and EZHΘ
on equal bases,
BΓ and ZH,
and in the same parallels,
AΘ and BH.

Ἔστω
παραλληλόγραμμα
τὰ ABΓΔ, EZHΘ
ἐπὶ ἴσων βάσεων ὄντα
τῶν BΓ, ZH
καὶ ἐν ταῖς αὐταῖς παραλλήλοις
ταῖς AΘ, BH·

Verilmiş olsun
paralelkenarlar
ABΓΔ ve EZHΘ
eşit
BΓ ve ZH tabanlarında,
ve aynı
AΘ ve BH paralellerinde.

I say that
equal is
parallelogram ABΓΔ
to EZHΘ.

λέγω, ὅτι
ἴσον ἐστὶ
τὸ ABΓΔ παραλληλόγραμμον
τῷ EZHΘ.

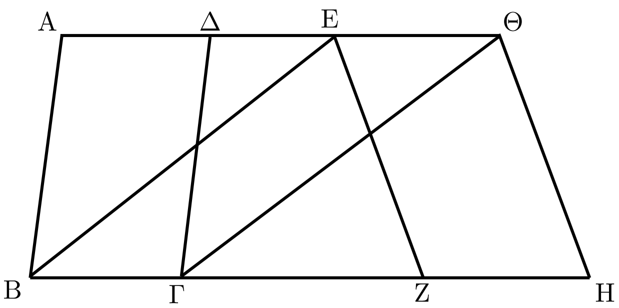
İddia ediyorum ki
eşittir
ABΓΔ,
EZHΘ paralelkenarına.

For, suppose have been joined

Ἐπεζεύχθωσαν γὰρ

Çünkü, varsayılsın birleştirilmiş

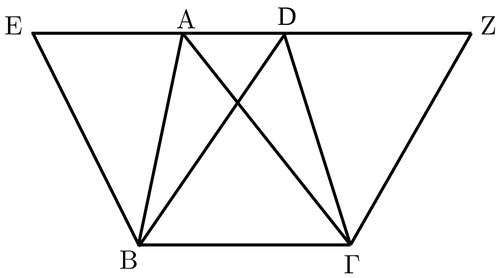
BE and ΓΘ.	αἱ ΒΕ, ΓΘ.	olduğu BE ile ΓΘ kenarlarının.
And since equal are ΒΓ and ΖΗ,	καὶ ἐπεὶ ἴση ἐστὶν ἡ ΒΓ τῇ ΖΗ,	Ve eşit olduğundan ΒΓ ile ΖΗ,
but ΖΗ to ΕΘ is equal,	ἀλλὰ ἡ ΖΗ τῇ ΕΘ ἐστιν ἴση,	ama ΖΗ, ΕΘ kenarına eşittir,
therefore also ΒΓ to ΕΘ is equal.	καὶ ἡ ΒΓ ἄρα τῇ ΕΘ ἐστιν ἴση.	dolayısıyla ΒΓ da ΕΘ kenarına eşittir.
And [they] are also parallel.	εἰσὶ δὲ καὶ παράλληλοι.	Ve paraleldirler de.
Also ΕΒ and ΘΓ join them.	καὶ ἐπιζευγνύουσιν αὐτὰς αἱ ΕΒ, ΘΓ·	Ayrıca ΕΒ ve ΘΓ onları birleştirir.
And [STRAIGHTS] that join equals and parallels in the same parts	αἱ δὲ τὰς ἴσας τε καὶ παραλλήλους ἐπὶ τὰ αὐτὰ μέρη ἐπιζευγνύουσαι	Ve eşit ve paralelleri aynı tarafta birleştiren doğrular
are equal and parallel.	ἴσαι τε καὶ παράλληλοί εἰσι	eşit ve paraleldirler.
[Also therefore ΕΒ and ΗΘ	[καὶ αἱ ΕΒ, ΘΓ ἄρα	[Yine dolayısıyla ΕΒ ve ΗΘ
are equal and parallel.]	ἴσαι τέ εἰσι καὶ παράλληλοι].	eşit ve paraleldirler.]
Therefore a parallelogram is ΕΒΓΘ.	παραλληλόγραμμον ἄρα ἐστὶ τὸ ΕΒΓΘ.	Dolayısıyla ΕΒΓΘ bir paralelkenardır.
And it is equal to ΑΒΓΔ.	καί ἐστιν ἴσον τῷ ΑΒΓΔ·	Ve eşittir ΑΒΓΔ paralelkenarına.
For it has the same base as it,	βάσιν τε γὰρ αὐτῷ τὴν αὐτὴν ἔχει	Çünkü onunla aynı,
ΒΓ,	τὴν ΒΓ,	ΒΓ tabanı vardır,
and in the same parallels	καὶ ἐν ταῖς αὐταῖς παραλλήλοις	ve onunla aynı,
as it it is, ΒΓ and ΑΘ.	ἐστὶν αὐτῷ ταῖς ΒΓ, ΑΘ.	ΒΓ ve ΑΘ paralellerindedir.
For the same [reason] then,	δὶα τὰ αὐτὰ δὴ	Aynı sebeple o şimdi,
also ΕΖΗΘ to it, [namely] ΕΒΓΘ,	καὶ τὸ ΕΖΗΘ τῷ αὐτῷ τῷ ΕΒΓΘ	ΕΖΗΘ da ona, [yani] ΕΒΓΘ paralelkenarına,
is equal;	ἐστιν ἴσον·	eşittir;
so that parallelogram ΑΒΓΔ	ὥστε καὶ τὸ ΑΒΓΔ παραλληλόγραμμον	böylece ΑΒΓΔ,
to ΕΖΗΘ is equal.	τῷ ΕΖΗΘ ἐστιν ἴσον.	ΕΖΗΘ paralelkenarına eşittir.
Therefore parallelograms	Τὰ ἄρα παραλληλόγραμμα	Dolayısıyla paralelkenarlar;
that are on equal bases	τὰ ἐπὶ ἴσων βάσεων ὄντα	eşit tabanlarda olanlar
and in the same parallels	καὶ ἐν ταῖς αὐταῖς παραλλήλοις	ve aynı paralellerde olanlar
are equal to one another;	ἴσα ἀλλήλοις ἐστίν·	eşittirler birbirlerine;
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	—gösterilmesi gereken tam buydu.



1.37

Triangles	Τὰ τρίγωνα	Üçgenler;
that are on the same base	τὰ ἐπὶ τῆς αὐτῆς βάσεως ὄντα	aynı tabanda
and in the same parallels	καὶ ἐν ταῖς αὐταῖς παραλλήλοις	ve aynı paralellerde olanlar,
are equal to one another.	ἴσα ἀλλήλοις ἐστίν.	eşittir birbirlerine.
Let there be	Ἔστω	Verilmiş olsun
triangles ΑΒΓ and ΔΒΓ,	τρίγωνα τὰ ΑΒΓ, ΔΒΓ	ΑΒΓ ve ΔΒΓ üçgenleri,
on the same base ΒΓ	ἐπὶ τῆς αὐτῆς βάσεως τῆς ΒΓ	aynı ΒΓ tabanında
and in the same parallels	καὶ ἐν ταῖς αὐταῖς παραλλήλοις	ve aynı
ΑΔ and ΒΓ.	ταῖς ΑΔ, ΒΓ·	ΑΔ ve ΒΓ paralellerinde.
I say that	λέγω, ὅτι	İddia ediyorum ki
equal is	ἴσον ἐστὶ	eşittir
triangle ΑΒΓ	τὸ ΑΒΓ τρίγωνον	ΑΒΓ üçgeni
to triangle ΔΒΓ.	τῷ ΔΒΓ τριγώνῳ.	ΔΒΓ üçgenine.
Suppose has been extended	Ἐκβεβλήσθω	Varsayılsın uzatılmış olduğu

AΔ on both sides to E and Z,	ἡ AΔ ἐφ᾽ ἑκάτερα τὰ μέρη ἐπὶ τὰ E, Z,	AΔ doğrusunun her iki kenarda E ve Z noktalarına,
and through B,	καὶ διὰ μὲν τοῦ B	ve B noktasından,
parallel to ΓA	τῇ ΓA παράλληλος	ΓA kenarına paralel
has been drawn BE,	ἤχθω ἡ BE,	BE çizilmiş olsun,
and through Γ	δὶα δὲ τοῦ Γ	ve Γ noktasından
parallel to BΔ	τῇ BΔ παράλληλος	BΔ kenarına papalel
has been drawn ΓZ.	ἤχθω ἡ ΓZ.	ΓZ çizilmiş olsun.
Therefore a parallelogram	παραλληλόγραμμον ἄρα	Dolayısıyla birer paralelkenardır
is either of EBΓA and ΔBΓZ;	ἐστὶν ἑκάτερον τῶν EBΓA, ΔBΓZ·	EBΓA ile ΔBΓZ;
and they are equal;	καί εἰσιν ἴσα·	ve bunlar eşittir;
for they are on the same base,	ἐπί τε γὰρ τῆς αὐτῆς βάσεώς εἰσι	aynı
BΓ,	τῆς BΓ	BΓ tabanında,
and in the same parallels,	καὶ ἐν ταῖς αὐταῖς παραλλήλοις	ve aynı,
BΓ and EZ;	ταῖς BΓ, EZ·	BΓ ve EZ paralellerinde oldukları için;
and [it] is	καί ἐστι	ve
of the parallelogram EBΓA	τοῦ μὲν EBΓA παραλληλογράμμου	EBΓA paralelkenarının
half	ἥμισυ	yarısı
—the triangle ABΓ;	τὸ ABΓ τρίγωνον·	— ABΓ üçgenidir;
for the diameter AB cuts it in two;	ἡ γὰρ AB διάμετρος αὐτὸ δίχα τέμνει·	AB köşegeni onu ikiye kestiği için;
and of the parallelogram ΔBΓZ	τοῦ δὲ ΔBΓZ παραλληλογράμμου	ve ΔBΓZ paralelkenarının
half	ἥμισυ	yarısı
—the triangle ΔBΓ;	τὸ ΔBΓ τρίγωνον·	— ΔBΓ üçgenidir;
for the diameter ΔΓ cuts it in two.	ἡ γὰρ ΔΓ διάμετρος αὐτὸ δίχα τέμνει.	ΔΓ köşegeni onu ikiye kestiği için.
[And halves of equals	[τὰ δὲ τῶν ἴσων ἡμίση	[Ve eşitlerin yarıları
are equal to one another.]	ἴσα ἀλλήλοις ἐστίν].	eşittirler birbirlerine.]
Therefore equal is	ἴσον ἄρα ἐστὶ	Dolayısıyla eşittir
the triangle ABΓ to the triangle ΔBΓ.	τὸ ABΓ τρίγωνον τῷ ΔBΓ τριγώνῳ.	ABΓ üçgeni ΔBΓ üçgenine.
Therefore triangles	Τὰ ἄρα τρίγωνα	Dolayısıyla üçgenler;
that are on the same base	τὰ ἐπὶ τῆς αὐτῆς βάσεως ὄντα	aynı tabanda
and in the same parallels	καὶ ἐν ταῖς αὐταῖς παραλλήλοις	ve aynı paralellerde olanlar,
are equal to one another;	ἴσα ἀλλήλοις ἐστίν·	eşittir birbirlerine;
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	—gösterilmesi gereken tam buydu.



1.38

Triangles	Τὰ τρίγωνα	Üçgenler;
that are on equal bases	τὰ ἐπὶ ἴσων βάσεων ὄντα	eşit tabanlarda
and in the same parallels	καὶ ἐν ταῖς αὐταῖς παραλλήλοις	ve aynı paralelerde olanlar,
are equal to one another.	ίσα ἀλλήλοις ἐστίν.	eşittir birbirlerine.
Let there be	Ἔστω	Verilmiş olsun
triangles ABΓ and ΔEZ	τρίγωνα τὰ ABΓ, ΔEZ	ABΓ ve ΔEZ üçgenleri
on equal bases BΓ and EZ	επὶ ἴσων βάσεων τῶν BΓ, EZ	eşit BΓ ve EZ tabanlarında
and in the same parallels	καὶ ἐν ταῖς αὐταῖς παραλλήλοις	ve aynı
BZ and AΔ.	ταῖς BZ, AΔ·	BZ ve AΔ paralellerinde.
I say that	λέγω, ὅτι	İddia ediyorum ki
equal is	ἴσον ἐστὶ	eşittir
triangle ABΓ	τὸ ABΓ τρίγωνον	ABΓ üçgeni

to triangle ΔΕΖ.

For, suppose has been extended
ΑΔ on both sides to Η and Θ,
and through Β,
parallel to ΓΑ,
has been drawn ΒΗ,
and through Ζ,
parallel to ΔΕ,
has been drawn ΖΘ.

Therefore a parallelogram
is either of ΗΒΓΑ and ΔΕΖΘ;
and ΗΒΓΑ [is] equal to ΔΕΖΘ;
for they are on equal bases,
ΒΓ and ΕΖ,
and in the same parallels,
ΒΖ and ΗΘ;
and [it] is
of the parallelogram ΗΒΓΑ
half
—the triangle ΑΒΓ.
For the diameter ΑΒ cuts it in two;
and of the parallelogram ΔΕΖΘ
half
—the triangle ΖΕΔ;
for the diameter ΔΖ cuts it in two.
[And halves of equals
are equal to one another.]
Therefore equal is
the triangle ΑΒΓ to the triangle ΔΕΖ.

Therefore triangles
that are on equal bases
and in the same parallels
are equal to one another;
—just what it was necessary to show.

τῷ ΔΕΖ τριγώνῳ.

Ἐκβεβλήσθω γὰρ
ἡ ΑΔ ἐφ᾽ ἑκάτερα τὰ μέρη ἐπὶ τὰ Η, Θ,
καὶ διὰ μὲν τοῦ Β
τῇ ΓΑ παράλληλος
ἤχθω ἡ ΒΗ,
δὶα δὲ τοῦ Ζ
τῇ ΔΕ παράλληλος
ἤχθω ἡ ΖΘ.

παραλληλόγραμμον ἄρα
ἐστὶν ἑκάτερον τῶν ΗΒΓΑ, ΔΕΖΘ·
καὶ ἴσον τὸ ΗΒΓΑ τῷ ΔΕΖΘ·
ἐπί τε γὰρ ἴσων βάσεών εἰσι
τῶν ΒΓ, ΕΖ
καὶ ἐν ταῖς αὐταῖς παραλλήλοις
ταῖς ΒΖ, ΗΘ·
καί ἐστι
τοῦ μὲν ΗΒΓΑ παραλληλογράμμου
ἥμισυ
τὸ ΑΒΓ τρίγωνον.
ἡ γὰρ ΑΒ διάμετρος αὐτὸ δίχα τέμνει·
τοῦ δὲ ΔΕΖΘ παραλληλογράμμου
ἥμισυ
τὸ ΖΕΔ τρίγωνον·
ἡ γὰρ ΔΖ δίαμετρος αὐτὸ δίχα τέμνει
[τὰ δὲ τῶν ἴσων ἡμίση
ἴσα ἀλλήλοις ἐστίν].
ἴσον ἄρα ἐστὶ
τὸ ΑΒΓ τρίγωνον τῷ ΔΕΖ τριγώνῳ.

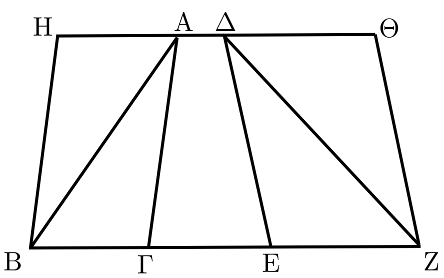
Τὰ ἄρα τρίγωνα
τὰ ἐπὶ ἴσων βάσεων ὄντα
καὶ ἐν ταῖς αὐταῖς παραλλήλοις
ἴσα ἀλλήλοις ἐστίν·
ὅπερ ἔδει δεῖξαι.

ΔΕΖ üçgenine.

Çünkü varsayılsın uzatılmış olduğu
ΑΔ kenarının her iki kenarda Η ve Θ noktalarına,
ve Β noktasından,
ΓΑ kenarına paralel,
ΒΗ çizilmiş olsun,
ve Ζ noktasından,
ΔΕ kenarına paralel,
ΖΘ çizilmiş olsun.

Dolayısıyla birer paralelkenardır
ΗΒΓΑ ile ΔΕΖΘ;
ve ΗΒΓΑ eşittir ΔΕΖΘ paralelkenarına;
eşit,
ΒΓ ve ΕΖ tabanlarında,
ve aynı,
ΒΖ ve ΗΘ paralellerinde oldukları için;
ve
ΗΒΓΑ paralelkenarının
yarısı
—ΑΒΓ üçgenidir.
ΑΒ köşegeni onu ikiye kestiği için;
ve ΔΕΖΘ paralelkenarının
yarısı
— ΖΕΔ üçgenidir;
ΔΖ köşegeni onu ikiye kestiği için.
[Ve eşitlerin yarıları
eşittirler birbirlerine.]
Dolayısıyla eşittir
ΑΒΓ üçgeni ΔΕΖ üçgenine.

Dolayısıyla üçgenler;
eşit tabanlarda
ve aynı paralelerde olanlar,
eşittir birbirlerine;
—gösterilmesi gereken tam buydu.



1.39

Equal triangles
that are on the same base
and in the same parts
are also in the same parallels.

Let there be
equal triangles ΑΒΓ and ΔΒΓ,
being on the same base
and on the same side of ΒΓ.

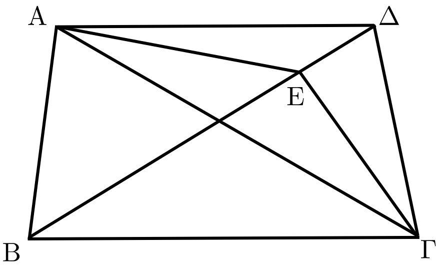
Τὰ ἴσα τρίγωνα
τὰ ἐπὶ τῆς αὐτῆς βάσεως ὄντα
καὶ ἐπὶ τὰ αὐτὰ μέρη
καὶ ἐν ταῖς αὐταῖς παραλλήλοις ἐστίν.

Ἔστω
ἴσα τρίγωνα τὰ ΑΒΓ, ΔΒΓ
ἐπὶ τῆς αὐτῆς βάσεως ὄντα
καὶ ἐπὶ τὰ αὐτὰ μέρη τῆς ΒΓ·

Eşit üçgenler;
aynı tabanda
ve onun aynı tarafında olan,
aynı paralellerdedirler de.

Verilmiş olsun
ΑΒΓ ve ΔΒΓ eşit üçgenleri,
aynı ΒΓ tabanında
ve onun aynı tarafında olan .

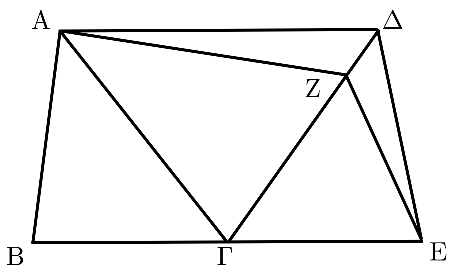
I say that	λέγω, ὅτι	İddia ediyorum ki
they are also in the same parallels.	καὶ ἐν ταῖς αὐταῖς παραλλήλοις ἐστίν.	aynı paralellerdedirler de.
For suppose has been joined ΑΔ.	Ἐπεζεύχθω γὰρ ἡ ΑΔ·	Çünkü ΑΔ doğrusunun birleştirilmiş olduğu varsayılsın.
I say that	λέγω, ὅτι	İddia ediyorum ki
parallel is ΑΔ to ΒΓ.	παράλληλός ἐστιν ἡ ΑΔ τῇ ΒΓ.	paraleldir ΑΔ, ΒΓ tabanına.
For if not,	Εἰ γὰρ μή,	Çünkü eğer değil ise,
suppose there has been drawn	ἤχθω	çizilmiş olduğu varsayılsın
through the point Α	διὰ τοῦ Α σημείου	Α noktasından
parallel to the STRAIGHT ΒΓ	τῇ ΒΓ εὐθείᾳ παράλληλος	ΒΓ doğrusuna paralel
ΑΕ,	ἡ ΑΕ,	ΑΕ doğrusunun,
and there has been joined ΕΓ.	καὶ ἐπεζεύχθω ἡ ΕΓ.	ve birleştirildiği ΕΓ doğrusunun.
Equal therefore is	ἴσον ἄρα ἐστὶ	Eşittir dolayısıyla
the triangle ΑΒΓ	τὸ ΑΒΓ τρίγωνον	ΑΒΓ üçgeni
to the triangle ΕΒΓ;	τῷ ΕΒΓ τριγώνῳ·	ΕΒΓ üçgenine;
for on the same base	ἐπί τε γὰρ τῆς αὐτῆς βάσεώς	onunla aynı
as it it is, ΒΓ,	ἐστιν αὐτῷ τῆς ΒΓ	ΒΓ tabanında,
and in the same parallels.	καὶ ἐν ταῖς αὐταῖς παραλλήλοις.	ve aynı paralellerde olduğu için.
But ΑΒΓ is equal to ΔΒΓ.	ἀλλὰ τὸ ΑΒΓ τῷ ΔΒΓ ἐστιν ἴσον·	Ama ΑΒΓ eşittir ΔΒΓ üçgenine.
Also therefore ΔΒΓ to ΕΒΓ is equal,	καὶ τὸ ΔΒΓ ἄρα τῷ ΕΒΓ ἴσον ἐστὶ	Ve dolayısıyla ΔΒΓ, ΕΒΓ üçgenine eşittir,
the greater to the less;	τὸ μεῖζον τῷ ἐλάσσονι·	büyük küçüğe;
which is impossible.	ὅπερ ἐστὶν ἀδύνατον·	ki bu imkansızdır.
Therefore is not parallel ΑΕ to ΒΓ.	οὐκ ἄρα παράλληλός ἐστιν ἡ ΑΕ τῇ ΒΓ.	Dolayısıyla paralel değildir ΑΕ, ΒΓ doğrusuna.
Similarly then we shall show that	ὁμοίως δὴ δείξομεν, ὅτι	Benzer şekilde o zaman göstereceğiz ki
neither is any other but ΑΔ;	οὐδ᾽ ἄλλη τις πλὴν τῆς ΑΔ·	ΑΔ dışındakiler de paralel değildid ;
therefore ΑΔ is parallel to ΒΓ.	ἡ ΑΔ ἄρα τῇ ΒΓ ἐστι παράλληλος.	dolayısıyla ΑΔ, ΒΓ doğrusuna paaraleldir.
Therefore equal triangles	Τὰ ἄρα ἴσα τρίγωνα	Dolayısıyla eşit üçgenler;
that are on the same base	τὰ ἐπὶ τῆς αὐτῆς βάσεως ὄντα	aynı tabanda
and in the same parts	καὶ ἐπὶ τὰ αὐτὰ μέρη	ve onun aynı tarafında olan,
are also in the same parallels;	καὶ ἐν ταῖς αὐταῖς παραλλήλοις ἐστίν·	aynı paralellerdedirler de;
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	—gösterilmesi gereken tam buydu.



1.40

Equal triangles	Τὰ ἴσα τρίγωνα	Eşit üçgenler,
that are on equal bases	τὰ ἐπὶ ἴσων βάσεων ὄντα	eşit tabanlarda
and in the same parts	καὶ ἐπὶ τὰ αὐτὰ μέρη	ve aynı tarafta olan,
are also in the same parallels.	καὶ ἐν ταῖς αὐταῖς παραλλήλοις ἐστίν.	aynı paralelerdedirler de.
Let there be	Ἔστω	Verilmiş olsun
equal triangles ΑΒΓ and ΓΔΕ,	ἴσα τρίγωνα τὰ ΑΒΓ, ΓΔΕ	eşit ΑΒΓ ve ΓΔΕ üçgenleri,
on equal bases ΒΓ and ΓΕ,	ἐπὶ ἴσων βάσεων τῶν ΒΓ, ΓΕ	eşit ΒΓ ve ΓΕ tabanlarında,
and in the same parts.	καὶ ἐπὶ τὰ αὐτὰ μέρη.	ve aynı tarafta olan.

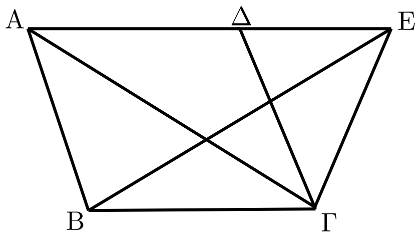
I say that	λέγω, ὅτι	İddia ediyorum ki
they are also in the same parallels.	καὶ ἐν ταῖς αὐταῖς παραλλήλοις ἐστίν.	aynı paralellerdedirler de.
For suppose ΑΔ has been joined.	Ἐπεζεύχθω γὰρ ἡ ΑΔ·	Çünkü varsayılsın ΑΔ doğrusunun birleştirildiği.
I say that	λέγω, ὅτι	İddia ediyorum ki
parallel is ΑΔ to ΒΕ.	παράλληλός ἐστιν ἡ ΑΔ τῇ ΒΕ.	paraleldir ΑΔ, ΒΕ doğrusuna.
For if not,	Εἰ γὰρ μή,	Çünkü eğer değil ise,
suppose there has been drawn	ἤχθω	varsayılsın birleştirildiği
through the point Α,	διὰ τοῦ Α	Α noktasından,
parallel to ΒΕ,	τῇ ΒΕ παράλληλος	ΒΕ doğrusuna paralel,
ΑΖ,	ἡ ΑΖ,	ΑΖ doğrusunun,
and there has been joined ΖΕ.	καὶ ἐπεζεύχθω ἡ ΖΕ.	ve birleştirildiği ΖΕ doğrusunun.
Equal therefore is	ἴσον ἄρα ἐστὶ	Dolayısıyla eşittir
the triangle ΑΒΓ	τὸ ΑΒΓ τρίγωνον	ΑΒΓ üçgeni
to the triangle ΖΓΕ;	τῷ ΖΓΕ τριγώνῳ·	ΖΓΕ üçgenine;
for they are on equal bases,	ἐπί τε γὰρ ἴσων βάσεών εἰσι	eşit,
ΒΓ and ΓΕ,	τῶν ΒΓ, ΓΕ	ΒΓ ve ΓΕ tabanlarında,
and in the same parallels,	καὶ ἐν ταῖς αὐταῖς παραλλήλοις	ve aynı,
ΒΕ and ΑΖ.	ταῖς ΒΕ, ΑΖ.	ΒΕ ve ΑΖ paralellerinde oldukları için.
But the triangle ΑΒΓ	ἀλλὰ τὸ ΑΒΓ τρίγωνον	Fakat ΑΒΓ üçgeni
is equal to the [triangle] ΔΓΕ;	ἴσον ἐστὶ τῷ ΔΓΕ [τρίγωνῳ]·	eşittir ΔΓΕ üçgenine;
also therefore the [triangle] ΔΓΕ	καὶ τὸ ΔΓΕ ἄρα [τρίγωνον]	ve dolayısıyla ΔΓΕ üçgenini
is equal to the triangle ΖΓΕ,	ἴσον ἐστὶ τῷ ΖΓΕ τριγώνῳ	eşittir ΖΓΕ üçgenine,
the greater to the less;	τὸ μεῖζον τῷ ἐλάσσονι·	büyük küçüğe;
which is impossible.	ὅπερ ἐστὶν ἀδύνατον·	ki bu imkansızdır.
Therefore is not parallel ΑΖ to ΒΕ.	οὐκ ἄρα παράλληλος ἡ ΑΖ τῇ ΒΕ.	Dolayısıyla paralel değildir ΑΖ, ΒΕ doğrusuna.
Similarly then we shall show that	ὁμοίως δὴ δείξομεν, ὅτι	Benzer şekilde o zaman göstereceğiz ki
neither is any other but ΑΔ;	οὐδ᾽ ἄλλη τις πλὴν τῆς ΑΔ·	ΑΔ dışındakiler de paralel değildir;
therefore ΑΔ to ΒΕ is parallel.	ἡ ΑΔ ἄρα τῇ ΒΕ ἐστι παράλληλος.	dolayısıyla ΑΔ, ΒΕ doğrusuna paraleldir.
Therefore equal triangles	Τὰ ἄρα ἴσα τρίγωνα	Dolayısıyla eşit üçgenler,
that are on equal bases	τὰ ἐπὶ ἴσων βάσεων ὄντα	eşit tabanlarda
and in the same parts	καὶ ἐπὶ τὰ αὐτὰ μέρη	ve aynı tarafta olan,
are also in the same parallels;	καὶ ἐν ταῖς αὐταῖς παραλλήλοις ἐστίν·	aynı paralelerdedirler de;
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	—gösterilmesi gereken tam buydu.



1.41

If a parallelogram	Ἐὰν παραλληλόγραμμον	Eğer bir paralelkenar
have the same base as a triangle,	τριγώνῳ βάσιν τε ἔχῃ τὴν αὐτὴν	bir üçgenle aynı tabana sahipse,
and be in the same parallels,	καὶ ἐν ταῖς αὐταῖς παραλλήλοις ᾖ,	ve aynı paralelerdeyse,
double is	διπλάσιόν ἐστί	iki katıdır
the parallelogram of the triangle.	τὸ παραλληλόγραμμον τοῦ τριγώνου.	paralelkenar, üçgenin.
For, the parallelogram ΑΒΓΔ	Παραλληλόγραμμον γὰρ τὸ ΑΒΓΔ	Çünkü ΑΒΓΔ paralelkenarının
as the triangle ΕΒΓ,	τριγώνῳ τῷ ΕΒΓ	ΕΒΓ üçgeniyle,
—suppose it has the same base, ΒΓ,	βάσιν τε ἐχέτω τὴν αὐτὴν τὴν ΒΓ	—aynı ΒΓ tabanı olduğu varsayılsın,

and is in the same parallels, ΒΓ and ΑΕ.	καὶ ἐν ταῖς αὐταῖς παραλλήλοις ἔστω ταῖς ΒΓ, ΑΕ·	ve aynı ΒΓ ve ΑΕ paralelerinde oldukları.
I say that double is the parallelogram ΑΒΓΔ of the triangle ΒΕΓ.	λέγω, ὅτι διπλάσιόν ἐστι τὸ ΑΒΓΔ παραλληλόγραμμον τοῦ ΒΕΓ τριγώνου.	İddia ediyorum ki iki katıdır ΑΒΓΔ paralelkenarı ΒΕΓ üçgeninin.
For, suppose ΑΓ has been joined.	Ἐπεζεύχθω γὰρ ἡ ΑΓ.	Çünkü, varsayılsın ΑΓ doğrusunun birleştirildiği.
Equal is the triangle ΑΒΓ to the triangle ΕΒΓ; for it is on the same base as it, ΒΓ, and in the same parallels, ΒΓ and ΑΕ. But the parallelogram ΑΒΓΔ is double of the triangle ΑΒΓ; for the diameter ΑΓ cuts it in two; so that the parallelogram ΑΒΓΔ also of the triangle ΕΒΓ is double.	ἴσον δή ἐστι τὸ ΑΒΓ τρίγωνον τῷ ἘΒΓ τριγώνῳ· ἐπί τε γὰρ τῆς αὐτῆς βάσεώς ἐστιν αὐτῷ τῆς ΒΓ καὶ ἐν ταῖς αὐταῖς παραλλήλοις ταῖς ΒΓ, ΑΕ. ἀλλὰ τὸ ἈΒΓΔ παραλληλόγραμμον διπλάσιόν ἐστι τοῦ ΑΒΓ τριγώνου· ἡ γὰρ ἈΓ διάμετρος αὐτὸ δίχα τέμνει· ὥστε τὸ ΑΒΓΔ παραλληλόγραμμον ᾽καὶ τοῦ ΕΒΓ τριγώνου ἐστὶ διπλάσιον.	Eşittir ΑΒΓ üçgeni ΕΒΓ üçgenine; onunla aynı, ΒΓ tabanına sahip, ve aynı ΒΓ ve ΑΕ paralelerinde olduğu için. Fakat ΑΒΓΔ paralelkenarı iki katıdır ΑΒΓ üçgeninin; ΑΓ köşegeni onu ikiye kestiğinden; böylece ΑΒΓΔ paralelkenarı da ΕΒΓ üçgeninin iki katıdır.
Therefore, if a parallelogram have the same base as a triangle, and be in the same parallels, double is the parallelogram of the triangle; —just what it was necessary to show.	Ἐὰν ἄρα παραλληλόγραμμον τριγώνῳ βάσιν τε ἔχῃ τὴν αὐτὴν καὶ ἐν ταῖς αὐταῖς παραλλήλοις ᾖ, διπλάσιόν ἐστί τὸ παραλληλόγραμμον τοῦ τριγώνου· ὅπερ ἔδει δεῖξαι.	Dolayısıyla, eğer bir paralelkenar bir üçgenle aynı tabana sahipse, ve aynı paralelerdeyse, iki katıdır paralelkenar, üçgenin; —gösterilmesi gereken tam buydu.



1.42

To the given triangle equal, a parallelogram to construct in the given rectilineal angle.	Τῷ δοθέντι τριγώνῳ ἴσον παραλληλόγραμμον συστήσασθαι ἐν τῇ δοθείσῃ γωνίᾳ εὐθυγράμμῳ.	Verilen bir üçgene eşit, bir paralelkenarı verilen bir düzkenar açıda inşa etmek.
Let be the given triangle ΑΒΓ, and the given rectilineal angle, Δ.	Ἔστω τὸ μὲν δοθὲν τρίγωνον τὸ ΑΒΓ, ἡ δὲ δοθεῖσα γωνία εὐθύγραμμος ἡ Δ·	Verilen üçgen ΑΒΓ, ve verilen düzkenar açı Δ olsun.
It is necessary then to the triangle ΑΒΓ equal a parallelogram to construct in the rectilineal angle Δ.	δεῖ δὴ τῷ ΑΒΓ τριγώνῳ ἴσον παραλληλόγραμμον συστήσασθαι ἐν τῇ Δ γωνίᾳ εὐθυγράμμῳ.	Şimdi gerklidir ΑΒΓ üçgenine eşit bir paralelkenarın Δ düzkenar açısına inşa edilmesi.
Suppose ΒΓ has been cut in two at Ε, and there has been joined ΑΕ, and there has been constructed on the STRAIGHT ΕΓ, and at the point Ε on it, to angle Δ equal, ΓΕΖ, also, through Α, parallel to ΕΓ,	Τετμήσθω ἡ ΒΓ δίχα κατὰ τὸ Ε, καὶ ἐπεζεύχθω ἡ ΑΕ, καὶ συνεστάτω πρὸς τῇ ΕΓ εὐθείᾳ καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ Ε τῇ Δ γωνίᾳ ἴσῃ ἡ ὑπὸ ΓΕΖ, καὶ διὰ μὲν τοῦ Α τῇ ΕΓ παράλληλος	Varsayılsın ΒΓ kenarının Ε noktasında ikiye kesildiği ve ΑΕ doğrusunun birleştirildiği, ve inşa edildiği ΕΓ doğrusunda, ve üzerindekiΕ noktasında, Δ açısına eşit, ΓΕΖ açısının,

suppose AH has been drawn,
and through Γ, parallel to EZ,
suppose ΓH has been drawn;
therefore a parallelogram is ZEΓH.

ἤχθω ἡ AH,
διὰ δὲ τοῦ Γ τῇ EZ παράλληλος
ἤχθω ἡ ΓH·
παραλληλόγραμμον ἄρα ἐστὶ τὸ ZEΓH.

ayrıca, A noktasından, EΓ doğrusuna paralel,
AH doğrusunun çizilmiş olduğu varsayılsın,
ve Γ noktasından, EZ doğrusuna paralel,
ΓH doğrusunun çizilmiş olduğu varsayılsın;
dolayısıyla ZEΓH bir paralelkenardır.

And since equal is BE to EΓ,
equal is also
triangle ABE to triangle AEΓ;
for they are on equal bases,
BE and EΓ,
and in the same parallels,
BΓ and AH;
double therefore is
triangle ABΓ of triangle AEΓ.
also is
parallelogram ZEΓH
double of triangle AEΓ;
for it has the same base as it,
and
is in the same parallels as it;
therefore is equal
the parallelogram ZEΓH
to the triangle ABΓ.
And it has angle ΓEZ
equal to the given Δ.

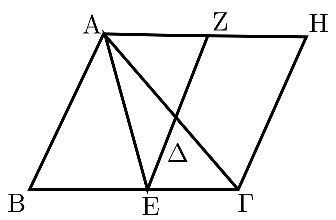
καὶ ἐπεὶ ἴση ἐστὶν ἡ BE τῇ EΓ,
ἴσον ἐστὶ καὶ
τὸ ABE τρίγωνον τῷ AEΓ τριγώνῳ·
ἐπί τε γὰρ ἴσων βάσεών εἰσι
τῶν BE, EΓ
καὶ ἐν ταῖς αὐταῖς παραλλήλοις
ταῖς BΓ, AH·
διπλάσιον ἄρα ἐστὶ
τὸ ABΓ τρίγωνον τοῦ AEΓ τριγώνου.
ἔστι δὲ καὶ
τὸ ZEΓH παραλληλόγραμμον
διπλάσιον τοῦ AEΓ τριγώνου·
βάσιν τε γὰρ αὐτῷ τὴν αὐτὴν ἔχει
καὶ
ἐν ταῖς αὐταῖς ἐστιν αὐτῷ παραλλήλοις·
ἴσον ἄρα ἐστὶ
τὸ ZEΓH παραλληλόγραμμον
τῷ ABΓ τριγώνῳ.
καὶ ἔχει τὴν ὑπὸ ΓEZ γωνίαν
ἴσην τῇ δοθείσῃ τῇ Δ.

Ve eşit olduğundan BE, EΓ doğrusuna,
eşittir
ABE üçgeni de AEΓ üçgenine;
tabanları
BE ve EΓ eşit,
ve aynı
BΓ ve AH paralelerinde oldukları için;
iki katıdır dolayısıyla
ABΓ üçgeni AEΓ üçgeninin,
ayrıca
ZEΓH paralelkenarı
iki katıdır AEΓ üçgeninin;
onunla aynı tabanı olduğu,
ve
onunla aynı paralellerde olduğu için;
dolayısıyla eşittir
ZEΓH paralelkenarı
ABΓ üçgenine.
Ve onun ΓEZ açısı
eşittir verilen Δ açısına.

Therefore, to the given triangle ABΓ
equal,
a parallelogram has been constructed,
ZEΓH,
in the angle ΓEZ,
which is equal to Δ;
—just what it was necessary to do.

Τῷ ἄρα δοθέντι τριγώνῳ τῷ ABΓ
ἴσον
παραλληλόγραμμον συνέσταται
τὸ ZEΓH
ἐν γωνίᾳ τῇ ὑπὸ ΓEZ,
ἥτις ἐστὶν ἴση τῇ Δ·
ὅπερ ἔδει ποιῆσαι.

Dolayısıyla, verilen ABΓ üçgenine
eşit,
bir paralelkenar,
ZEΓH, inşa edilmiş oldu
ΓEZ aşısında,
Δ aşısına eşit olan;
—yapılması gereken tam buydu.



1.43

Of any parallelogram,
of the parallelograms about the diameter,
the complements
are equal to one another.

Παντὸς παραλληλογράμμου
τῶν περὶ τὴν διάμετρον παραλληλογράμμων
τὰ παραπληρώματα
ἴσα ἀλλήλοις ἐστίν.

Herhangi bir paralelkenarın,
köşegeni etrafındaki paralelkenarların,
tümleyenleri
eşittir birbirlerine.

Let there be
a parallelogram ABΓΔ,
and its diameter, AΓ,
and about AΓ
let be parallelograms,
EΘ and ZH,[1]

Ἔστω
παραλληλόγραμμον τὸ ABΓΔ,
διάμετρος δὲ αὐτοῦ ἡ AΓ,
περὶ δὲ τὴν AΓ
παραλληλόγραμμα μὲν ἔστω
τὰ EΘ, ZH,

Verilmiş olsun
bir ABΓΔ paralelkenarı,
ve onun AΓ köşegeni,
ve AΓ etrafında
paralelkenarlar,
EΘ ve ZH,

and the so-called[2] complements,
BK and KΔ.

τὰ δὲ λεγόμενα παραπληρώματα
τὰ BK, KΔ·

ve bunların tümleyenleri,
BK ile KΔ.

I say that
equal is the complement BK
to the complement KΔ.

λέγω, ὅτι
ἴσον ἐστὶ τὸ BK παραπλήρωμα
τῷ KΔ παραπληρώματι.

İddia ediyorum
eşittir BK tümleyeni
KΔ tümleyenine.

For, since a parallelogram is
ΑΒΓΔ,
and its diameter, ΑΓ,
equal is
triangle ΑΒΓ to triangle ΑΓΔ.
Moreover, since a parallelogram is
ΕΘ,
and its diameter, ΑΚ,
equal is
triangle ΑΕΚ to triangle ΑΘΚ.
Then for the same [reasons] also
triangle ΚΖΓ to ΚΗΓ is equal.
Since then triangle ΑΕΚ
is equal to triangle ΑΘΚ,
and ΚΖΓ to ΚΗΓ,
triangle ΑΕΚ with ΚΗΓ
is equal
to triangle ΑΘΚ with ΚΖΓ;
also is triangle ΑΒΓ, as a whole,
equal to ΑΔΓ, as a whole;
therefore the complement BK remaining
to the complement KΔ remaining
is equal.

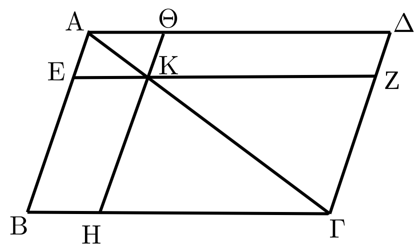
Ἐπεὶ γὰρ παραλληλόγραμμόν ἐστι
τὸ ΑΒΓΔ,
διάμετρος δὲ αὐτοῦ ἡ ΑΓ,
ἴσον ἐστὶ
τὸ ΑΒΓ τρίγωνον τῷ ΑΓΔ τριγώνῳ.
πάλιν, ἐπεὶ παραλληλόγραμμόν ἐστι
τὸ ΕΘ,
διάμετρος δὲ αὐτοῦ ἐστιν ἡ ΑΚ,
ἴσον ἐστὶ
τὸ ΑΕΚ τρίγωνον τῷ ΑΘΚ τριγώνῳ.
διὰ τὰ αὐτὰ δὴ καὶ
τὸ ΚΖΓ τρίγωνον τῷ ΚΗΓ ἐστιν ἴσον.
ἐπεὶ οὖν τὸ μὲν ΑΕΚ τρίγωνον
τῷ ΑΘΚ τριγώνῳ ἐστὶν ἴσον,
τὸ δὲ ΚΖΓ τῷ ΚΗΓ,
τὸ ΑΕΚ τρίγωνον μετὰ τοῦ ΚΗΓ
ἴσον ἐστὶ
τῷ ΑΘΚ τριγώνῳ μετὰ τοῦ ΚΖΓ·
ἔστι δὲ καὶ ὅλον τὸ ΑΒΓ τρίγωνον
ὅλῳ τῷ ΑΔΓ ἴσον·
λοιπὸν ἄρα τὸ ΒΚ παραπλήρωμα
λοιπῷ τῷ ΚΔ παραπληρώματί
ἐστιν ἴσον.

Çünkü, bir paralelkenar olduğundan
ΑΒΓΔ,
ve ΑΓ, onun köşegeni,
eşittir
ΑΒΓ üçgeni ΑΓΔ üçgenine.
Dahası, bir paralelkenar olduğundan
ΕΘ,
ΑΚ,onun köşegeni,
eşittir
ΑΕΚ üçgeni ΑΘΚüçgenine.
Şimdi aynı nedenle
ΚΖΓ eşittir ΚΗΓ üçgenine.
O zaman ΑΕΚ
eşit olduğundan ΑΘΚ üçgenine,
ve ΚΖΓ, ΚΗΓ üçgenine,
ΑΕΚ ile ΚΗΓ üçgenleri
eşittirl
ΑΘΚ ile ΚΖΓ üçgenlerine;
ayrıca ΑΒΓ üçgeninin tümü
eşittir ΑΔΓ üçgeninin tümüne;
dolayısıyla geriye kalan BK tümleyeni,
geriye kalan KΔ tümleyenine
eşittir.

Therefore, of any parallelogram area,
of the about-the-diameter
parallelograms,
the complements
are equal to one another;
—just what it was necessary to show.

Παντὸς ἄρα παραλληλογράμμου χωρίου
τῶν περὶ τὴν διάμετρον
παραλληλογράμμων
τὰ παραπληρώματα
ἴσα ἀλλήλοις ἐστίν·
ὅπερ ἔδει δεῖξαι.

Dolayısıyla, herhangi bir paralelkenarın,
köşegeni etrafındaki paralelkenarların,
tümleyenleri
eşittir birbirlerine;
—gösterilmesi gereken tam buydu.



1.44

Along the given STRAIGHT,
equal to the given triangle,
to apply a parallelogram
in the given rectilineal angle.

Παρὰ τὴν δοθεῖσαν εὐθεῖαν
τῷ δοθέντι τριγώνῳ ἴσον
παραλληλόγραμμον παραβαλεῖν
ἐν τῇ δοθείσῃ γωνίᾳ εὐθυγράμμῳ.

Verilen bir doğru boyunca
verilen bir üçgene eşit,
bir paralel kenarı yerleştirmek
verilen bir düz kenar açıda.

Let be
the given STRAIGHT AB,

Ἔστω
ἡ μὲν δοθεῖσα εὐθεῖα ἡ AB,

Verilen doğru AB,
ve verilen üçgen Γ,

[1]Here Euclid can use two letters without qualification for a parallelogram, because they are not unqualified in the Greek: they take the neuter article, while a line takes the feminine article.

[2]This is Heath's translation. The Greek does not require anything corresponding to 'so-'. The LSJ lexicon [10] gives the present proposition as the original geometrical use of παραπλήρωμα—other meanings are 'expletive' and a certain flowering herb.

and the given triangle, Γ, and the given rectilineal angle, Δ.	τὸ δὲ δοθὲν τρίγωνον τὸ Γ, ἡ δὲ δοθεῖσα γωνία εὐθύγραμμος ἡ Δ·	ve verlen düzkenar açı Δ olsun.
It is necessary then along the given STRAIGHT AB equal to the given triangle Γ to appy a parallelogram in an equal to the angle Δ.	δεῖ δὴ παρὰ τὴν δοθεῖσαν εὐθεῖαν τὴν ΑΒ τῷ δοθέντι τριγώνῳ τῷ Γ ἴσον παραλληλόγραμμον παραβαλεῖν ἐν ἴσῃ τῇ Δ γωνίᾳ.	Şimdi gereklidir verilen AB doğrusu boyunca Γ üçgenine eşit bir paralelkenarı Δ açısında yerleştirmek.
Suppose has been constructed equal to triangle Γ, a parallelogram BEZH in angle EBH, which is equal to Δ; and let it be laid down so that on a STRAIGHT is BE with AB, and suppose has been drawn through ZH to Θ, and through A, parallel to either of BH and EZ, suppose there has been drawn AΘ, and suppose there has been joined ΘB.	Συνεστάτω τῷ Γ τριγώνῳ ἴσον παραλληλόγραμμον τὸ ΒΕΖΗ ἐν γωνίᾳ τῇ ὑπὸ ΕΒΗ, ἥ ἐστιν ἴση τῇ Δ· καὶ κείσθω ὥστε ἐπ᾽ εὐθείας εἶναι τὴν ΒΕ τῇ ΑΒ, καὶ διήχθω ἡ ΖΗ ἐπὶ τὸ Θ, καὶ διὰ τοῦ Α ὁποτέρᾳ τῶν ΒΗ, ΕΖ παράλληλος ἤχθω ἡ ΑΘ, καὶ ἐπεζεύχθω ἡ ΘΒ.	Varsayılsın inşa edildiği Γ üçgenine eşit, bir BEZH paralelkenarının EBH açısında, eşit olanΔ açısına; ve öyle yerleştirilmiş olsun ki bir doğruda kalsın BE, AB ile, ve çizilmiş olsun ZH dogrusundan Θ noktasına, ve A noktasından, paralel olan BH ve EZ doğrularından birine, çizilmiş olsun AΘ, ve birleştirilmiş olsun ΘB.
And since on the parallels AΘ and EZ fell the STRAIGHT ΘZ, the angles AΘZ and ΘZE are equal to two RIGHTs. Therefore BΘH and HZE are less than two RIGHTs. And [STRAIGHTs] from [angles] that are less than two RIGHTs, extended to the infinite, fall together. Therefore ΘB and ZE, extended, fall together.	καὶ ἐπεὶ εἰς παραλλήλους τὰς ΑΘ, ΕΖ εὐθεῖα ἐνέπεσεν ἡ ΘΖ, αἱ ἄρα ὑπὸ ΑΘΖ, ΘΖΕ γωνίαι δυσὶν ὀρθαῖς εἰσιν ἴσαι. αἱ ἄρα ὑπὸ ΒΘΗ, ΗΖΕ δύο ὀρθῶν ἐλάσσονές εἰσιν· αἱ δὲ ἀπὸ ἐλασσόνων ἢ δύο ὀρθῶν εἰς ἄπειρον ἐκβαλλόμεναι συμπίπτουσιν· αἱ ΘΒ, ΖΕ ἄρα ἐκβαλλόμεναι συμπεσοῦνται.	Ve AΘ ile EZ paralellerinin üzerine düştüğünden ΘZ doğrusu, AΘZ ve ΘZE açıları eşittir iki dik açıya. Dolayısıyla BΘH veHZE küçüktür iki dik açıdan. Ve küçük olanlardan iki dik açıdan, uzatıldıklarında sonsuza, birbirlerine düşerler doğrular. Dolayısıyla ΘB ve ZE, uzatılırsa, birbirlerine düşerler.
Suppose they have been extended, and they have fallen together at K, and through the point K, parallel to either of EA and ZΘ, suppose has been drawn KΛ, and suppose have been extended ΘA and HB to the points Λ and M.	ἐκβεβλήσθωσαν καὶ συμπιπτέτωσαν κατὰ τὸ Κ, καὶ διὰ τοῦ Κ σημείου ὁποτέρᾳ τῶν ΕΑ, ΖΘ παράλληλος ἤχθω ἡ ΚΛ, καὶ ἐκβεβλήσθωσαν αἱ ΘΑ, ΗΒ ἐπὶ τὰ Λ, Μ σημεῖα.	Varsayılsın uzatıldıkları, ve K noktasında kesiştikleri, ve K noktasından, paralel olan EA veya ZΘ doğrusuna, çizilmiş olsun KΛ, ve uzatılmış olsunlar ΘA ve HB doğruları Λ ve M noktalarından.
A parallelogram therefore is ΘΛKZ, a diameter of it is ΘK, and about ΘK [are] the parallelograms AH and ME, and the so-called complements, ΛB and BZ; equal therefore is ΛB to BZ. But BZ to triangle Γ is equal. Also therefore ΛB to Γ is equal. And since equal is angle HBE to ABM, but HBE to Δ is equal, also therefore ABM to Δ	παραλληλόγραμμον ἄρα ἐστὶ τὸ ΘΛΚΖ, διάμετρος δὲ αὐτοῦ ἡ ΘΚ, περὶ δὲ τὴν ΘΚ παραλληλόγραμμα μὲν τὰ ΑΗ, ΜΕ, τὰ δὲ λεγόμενα παραπληρώματα τὰ ΛΒ, ΒΖ· ἴσον ἄρα ἐστὶ τὸ ΛΒ τῷ ΒΖ. ἀλλὰ τὸ ΒΖ τῷ Γ τριγώνῳ ἐστὶν ἴσον· καὶ τὸ ΛΒ ἄρα τῷ Γ ἐστιν ἴσον. καὶ ἐπεὶ ἴση ἐστὶν ἡ ὑπὸ ΗΒΕ γωνία τῇ ὑπὸ ΑΒΜ, ἀλλὰ ἡ ὑπὸ ΗΒΕ τῇ Δ ἐστιν ἴση, καὶ ἡ ὑπὸ ΑΒΜ ἄρα τῇ Δ γωνίᾳ	Bir paralelkenardır dolayısıyla ΘΛKZ, ve onun köşegeni ΘK, ve ΘK etrafındadır AH ve ME paralelkenarları, ve bunların tümleyenleris, ΛB ileBZ; eşittirler dolayısıyla ΛB ile BZ tümleyenlerine. Ama BZ, Γ üçgenine eşittir. Dolaysısıyla ΛB da Γ üçgenine eşittir. Ve eşit olduğundan HBE, ABM açısına, fakat HBE, Δ açısına eşit,

is equal.

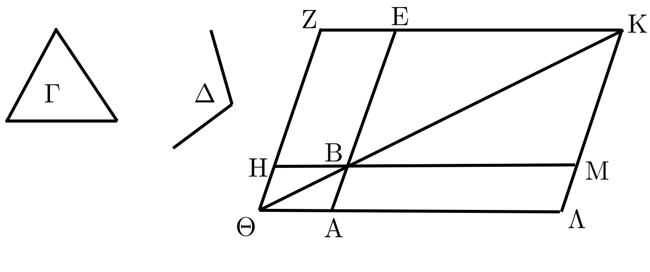
ἐστὶν ἴση.

dolayısıyla ΑΒΜ de Δ açısına
eşittir.

Therefore, along the given STRAIGHT, ΑΒ,
equal to the given triangle, Γ,
a parallelogram has been applied,
ΛΒ,
in the angle ΑΒΜ,
which is equal to Δ;
—just what it was necessary to do.

Παρὰ τὴν δοθεῖσαν ἄρα εὐθεῖαν
τὴν ΑΒ
τῷ δοθέντι τριγώνῳ τῷ Γ ἴσον
παραλληλόγραμμον παραβέβληται
τὸ ΛΒ
ἐν γωνίᾳ τῇ ὑπὸ ΑΒΜ,
ἥ ἐστιν ἴση τῇ Δ·
ὅπερ ἔδει ποιῆσαι.

Dolaysısyla, verilen bir,
ΑΒ doğrusu boyunca,
verilen bir Γ üçgenine eşit,
bir,
ΛΒ paralelkenarı yerleştirilmiş oldu,
ΑΒΜ aşısında,
eşit olan Δ açısına;
—yapılması gereken tam buydu.



1.45

To the given rectilineal [figure] equal
a parallelogram to construct
in the given rectilineal angle.

Τῷ δοθέντι εὐθυγράμμῳ ἴσον
παραλληλόγραμμον συστήσασθαι
ἐν τῇ δοθείσῃ γωνίᾳ εὐθυγράμμῳ.

Verilen bir düzkenar [figüre] eşit
bir paralelkenar inşa etmek,
verilen düzkenar açıda.

Let be
the given rectilineal [figure] ΑΒΓΔ,
and the given rectilineal angle, Ε.

Ἔστω
τὸ μὲν δοθὲν εὐθύγραμμον τὸ ΑΒΓΔ,
ἡ δὲ δοθεῖσα γωνία εὐθύγραμμος ἡ Ε·

Verilmiş olsun
ΑΒΓΔ düzkenar [figürü],
ve düzkenar Ε açısı.

It is necessary then
to the rectilineal ΑΒΓΔ equal
a parallelogram to construct
in the given angle Ε.

δεῖ δὴ
τῷ ΑΒΓΔ εὐθυγράμμῳ ἴσον
παραλληλόγραμμον συστήσασθαι
ἐν τῇ δοθείσῃ γωνίᾳ τῇ Ε.

Gereklidir şimdi
ΑΒΓΔ düzkenarına eşit
bir paralelkenar inşa etmek,
verilen Ε açısında.

Suppose has been joined ΔΒ,
and suppose has been constructed,
equal to the triangle ΑΒΔ,
a parallelogram, ΖΘ,
in the angle ΘΚΖ,
which is equal to Ε;
and suppose there has been applied
along the STRAIGHT ΗΘ,
equal to triangle ΔΒΓ,
a parallelogram, ΗΜ,
in the angle ΗΘΜ,
which is equal to Ε.

Ἐπεζεύχθω ἡ ΔΒ,
καὶ συνεστάτω
τῷ ΑΒΔ τριγώνῳ ἴσον
παραλληλόγραμμον τὸ ΖΘ
ἐν τῇ ὑπὸ ΘΚΖ γωνίᾳ,
ἥ ἐστιν ἴση τῇ Ε·
καὶ παραβεβλήσθω
παρὰ τὴν ΗΘ εὐθεῖαν
τῷ ΔΒΓ τριγώνῳ ἴσον
παραλληλόγραμμον τὸ ΗΜ
ἐν τῇ ὑπὸ ΗΘΜ γωνίᾳ,
ἥ ἐστιν ἴση τῇ Ε.

Birleştirilmiş olduğu ΔΒ doğrusunun,
ve inşa edilmiş olsun,
ΑΒΔ üçgenine eşit,
bir ΖΘ paralelkenarı,
ΘΚΖ açısında,
eşit olan Ε açısına;
ve yerleştirilmiş olsun
ΗΘ doğrusu boyunca ,
ΔΒΓ üçgenine eşit,
bir ΗΜ paralelkenarı,
ΗΘΜ açısında,
eşit olan Ε açısına.

And since angle Ε
to either of ΘΚΖ and ΗΘΜ
is equal,
therefore also ΘΚΖ to ΗΘΜ
is equal.
Let ΚΘΗ be added in common;
therefore ΖΚΘ and ΚΘΗ
to ΚΘΗ and ΗΘΜ
are equal.
But ΖΚΘ and ΚΘΗ
are equal to two RIGHTs;
therefore also ΚΘΗ and ΗΘΜ
are equal to two RIGHTs.

καὶ ἐπεὶ ἡ Ε γωνία
ἑκατέρᾳ τῶν ὑπὸ ΘΚΖ, ΗΘΜ
ἐστιν ἴση,
καὶ ἡ ὑπὸ ΘΚΖ ἄρα τῇ ὑπὸ ΗΘΜ
ἐστιν ἴση.
κοινὴ προσκείσθω ἡ ὑπὸ ΚΘΗ·
αἱ ἄρα ὑπὸ ΖΚΘ, ΚΘΗ
ταῖς ὑπὸ ΚΘΗ, ΗΘΜ
ἴσαι εἰσίν.
ἀλλ᾽ αἱ ὑπὸ ΖΚΘ, ΚΘΗ
δυσὶν ὀρθαῖς ἴσαι εἰσίν·
καὶ αἱ ὑπὸ ΚΘΗ, ΗΘΜ ἄρα
δύο ὀρθαῖς ἴσαι εἰσίν.

Ve Ε açısı
ΘΚΖ ve ΗΘΜ açılarının her birine
eşit olduğundan,
ΘΚΖ da ΗΘΜ açısına
eşittir.
Eklenmiş olsun ΚΘΗ ortak olarak;
dolayısıyla ΖΚΘ ve ΚΘΗ,
ΚΘΗ ve ΗΘΜ açılarına
eşittirler.
Fakat ΖΚΘ ve ΚΘΗ
eşittirler iki dik açıya;
dolayısıyla ΚΘΗ ve ΗΘΜ açılarıda
eşittirler iki dik açıya.

Then to some STRAIGHT, ΗΘ,
and at the same point, Θ,
two STRAIGHTs, ΚΘ and ΘΜ,
not lying in the same parts,
the adjacent angles
make equal to two RIGHTs.
In a STRAIGHT then are ΚΘ and ΘΜ;
and since on the parallels ΚΜ and ΖΗ
fell the STRAIGHT ΘΗ,
the alternate angles ΜΘΗ and ΘΗΖ
are equal to one another.
Let ΘΗΛ be added in common;
therefore ΜΘΗ and ΘΗΛ
to ΘΗΖ and ΘΗΛ
are equal.
But ΜΘΗ and ΘΗΛ
are equal to two RIGHTs;
therefore also ΘΗΖ and ΘΗΛ
are equal to two RIGHTs;
therefore on a STRAIGHT are ΖΗ and ΗΛ.
And since ΖΚ to ΘΗ
is equal and parallel,
but also ΘΗ to ΜΛ,
therefore also ΚΖ to ΜΛ
is equal and parallel;
and join them
ΚΜ and ΖΛ, which are STRAIGHTs;
therefore also ΚΜ and ΖΛ
are equal and parallel;
a parallelogram therefore is ΚΖΛΜ.
And since equal is
triangle ΑΒΔ
to the parallelogram ΖΘ,
and ΔΒΓ to ΗΜ,
therefore, as a whole,
the rectilineal ΑΒΓΔ
to parallelogram ΚΖΛΜ as a whole
is equal.

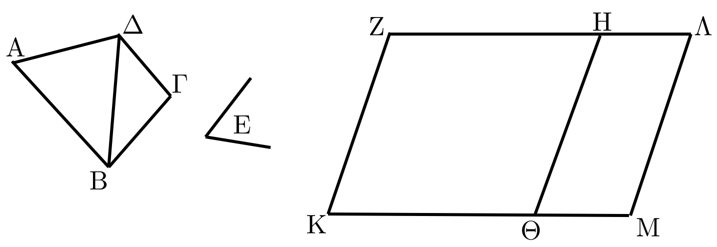
πρὸς δή τινι εὐθεῖᾳ τῇ ΗΘ
καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ Θ
δύο εὐθεῖαι αἱ ΚΘ, ΘΜ
μὴ ἐπὶ τὰ αὐτὰ μέρη κείμεναι
τὰς ἐφεξῆς γωνίας
δύο ὀρθαῖς ἴσας ποιοῦσιν·
ἐπ᾽ εὐθείας ἄρα ἐστὶν ἡ ΚΘ τῇ ΘΜ·
καὶ ἐπεὶ εἰς παραλλήλους τὰς ΚΜ, ΖΗ
εὐθεῖα ἐνέπεσεν ἡ ΘΗ,
αἱ ἐναλλὰξ γωνίαι αἱ ὑπὸ ΜΘΗ, ΘΗΖ ἴσαι
ἀλλήλαις εἰσίν.
κοινὴ προσκείσθω ἡ ὑπὸ ΘΗΛ·
αἱ ἄρα ὑπὸ ΜΘΗ, ΘΗΛ ταῖς ὑπὸ ΘΗΖ, ΘΗΛ
ίσαι εἰσιν.
αλλ᾽ αἱ ὑπὸ ΜΘΗ, ΘΗΛ
δύο ὀρθαῖς ἴσαι εἰσίν·
καὶ αἱ ὑπὸ ΘΗΖ, ΘΗΛ ἄρα
δύο ὀρθαῖς ἴσαι εἰσίν·
ἐπ᾽ εὐθείας ἄρα ἐστὶν ἡ ΖΗ τῇ ΗΛ.
καὶ ἐπεὶ ἡ ΖΚ τῇ ΘΗ
ἴση τε καὶ παράλληλός ἐστιν,
ἀλλὰ καὶ ἡ ΘΗ τῇ ΜΛ,
καὶ ἡ ΚΖ ἄρα τῇ ΜΛ
ἴση τε καὶ παράλληλός ἐστιν·
καὶ ἐπιζευγνύουσιν αὐτὰς εὐθεῖαι αἱ ΚΜ, ΖΛ·
καὶ αἱ ΚΜ, ΖΛ ἄρα
ἴσαι τε καὶ παράλληλοί εἰσιν·
παραλληλόγραμμον ἄρα ἐστὶ τὸ ΚΖΛΜ.
καὶ ἐπεὶ ἴσον ἐστὶ
τὸ μὲν ΑΒΔ τρίγωνον τῷ ΖΘ παραλληλογράμμῳ,
τὸ δὲ ΔΒΓ τῷ ΗΜ,
ὅλον ἄρα τὸ ΑΒΓΔ εὐθύγραμμον
ὅλῳ τῷ ΚΖΛΜ παραλληλογράμμῳ
ἐστὶν ἴσον.

Şimdi bir ΗΘ doğrusuna,
ve aynı Θ noktasında,
iki ΚΘ ve ΘΜ doğruları,
aynı tarafta kalmayan,
komşu açıları
iki dik açıya eşit yapar.
O zaman bir doğrudadır ΚΘ ve ΘΜ;
ve ΚΜ ve ΖΗ paralelleri üzerine
düştüğünden ΘΗ doğrusu,
ters ΜΘΗ ve ΘΗΖ açıları
eşittir birbirine.
eklenmiş olsun ΘΗΛ ortak olarak;
dolayısıyla ΜΘΗ ve ΘΗΛ,
ΘΗΖ ve ΘΗΛ açılarına
eşittirler.
Fakat ΜΘΗ ve ΘΗΛ
eşittirler iki dik açıya;
dolayısıyla ΘΗΖ ve ΘΗΛ da
eşittirler iki dik açıya;
dolaysısyla bir doğru üzerindedir ΖΗ ve ΗΛ.
Ve olduğundan ΖΚ, ΘΗ doğrusuna
eşit ve paralel,
ve de ΘΗ, ΜΛ doğrusuna,
dolayısıyla ΚΖ da ΜΛ doğrusuna
eşit ve paraleldir;
ve birleştirir onları ΚΜ ile ΖΛ, ki bunlarda doğrulardır;
dolayısıyla ΚΜ ve ΖΛ da
eşit ve paraleldirler;
dolayısıyla ΚΖΛΜ bir paralelkenardır.
Ve eşit olduğundan
ΑΒΔ üçgeni
ΖΘ paralelkenarına,
ve ΔΒΓ, ΗΜ paralelkenarına,
dolayısısyla, bir bütün olarak,
ΑΒΓΔ düzkenarı
bir bütün olarak ΚΖΛΜ paralelkenarına
eşittir.

Therefore, to the given rectilineal [figure], ΑΒΓΔ, equal,
a parallelogram has been constructed, ΚΖΛΜ,
in the angle ΖΚΜ,
which is equal to the given Ε;
—just what it was necessary to do.

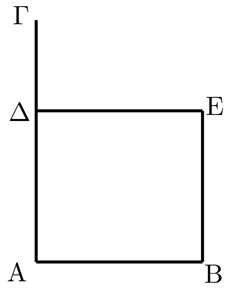
Τῷ ἄρα δοθέντι εὐθυγράμμῳ τῷ ΑΒΓΔ ἴσον
παραλληλόγραμμον συνέσταται
τὸ ΚΖΛΜ
ἐν γωνίᾳ τῇ ὑπὸ ΖΚΜ,
ἥ ἐστιν ἴση τῇ δοθείσῃ τῇ Ε·
ὅπερ ἔδει ποιῆσαι.

Dolayısıyla, verilen düzkenar ΑΒΓΔ figürüne eşit,
bir ΚΖΛΜ paralelkenarı inşa edilmiş oldu,
ΖΚΜ açısında,
eşit olan verilmiş Ε açısına;
—yapılması gereken tam buydu.



1.46

On the given STRAIGHT to set up a square.	Ἀπὸ τῆς δοθείσης εὐθείας τετράγωνον ἀναγράψαι.	Verilen bir doğruda bir kare kurmak.
Let be the given STRAIGHT AB.	Ἔστω ἡ δοθεῖσα εὐθεῖα ἡ ΑΒ·	Verilmiş olsun AB doğrusu.
It is required then on the STRAIGHT AB to set up a square.	δεῖ δὴ ἀπὸ τῆς ΑΒ εὐθείας τετράγωνον ἀναγράψαι.	Şimdi gereklidir AB doğrusunda bir kare kurmak.
Suppose there has been drawn to the STRAIGHT AB, at the point A of it, at a RIGHT, ΑΓ, and suppose there has been laid down, equal to AB, ΑΔ; and through the point Δ, parallel to AB, suppose there has been drawn ΔΕ; and through the point B, parallel to ΑΔ, suppose there has been drawn BE.	Ἤχθω τῇ ΑΒ εὐθείᾳ ἀπὸ τοῦ πρὸς αὐτῇ σημείου τοῦ Α πρὸς ὀρθὰς ἡ ΑΓ, καὶ κείσθω τῇ ΑΒ ἴση ἡ ΑΔ· καὶ διὰ μὲν τοῦ Δ σημείου τῇ ΑΒ παράλληλος ἤχθω ἡ ΔΕ, διὰ δὲ τοῦ Β σημείου τῇ ΑΔ παράλληλος ἤχθω ἡ ΒΕ.	Çizilmiş olsun AB doğrusunda, onun A noktasında, dik açıda, ΑΓ, ve yerleştirilmiş olsun, AB doğrusuna eşit, ΑΔ; ve Δ noktasından, AB doğrusuna paralel, çizilmiş olsun ΔΕ; ve B noktasından, ΑΔ doğrusuna paralel, BE çizilmiş olsun.
A parallelogram therefore is ΑΔΕΒ; equal therefore is AB to ΔΕ, and ΑΔ to BE. But AB to ΑΔ is equal. Therefore the four ΒΑ, ΑΔ, ΔΕ, and ΕΒ are equal to one another; equilateral therefore is the parallelogram ΑΔΕΒ.	παραλληλόγραμμον ἄρα ἐστὶ τὸ ΑΔΕΒ· ἴση ἄρα ἐστὶν ἡ μὲν ΑΒ τῇ ΔΕ, ἡ δὲ ΑΔ τῇ ΒΕ. ἀλλὰ ἡ ΑΒ τῇ ΑΔ ἐστιν ἴση· αἱ τέσσαρες ἄρα αἱ ΒΑ, ΑΔ, ΔΕ, ΕΒ ἴσαι ἀλλήλαις εἰσίν· ἰσόπλευρον ἄρα ἐστὶ τὸ ΑΔΕΒ παραλληλόγραμμον.	Bir paralelkenardır dolayısıyla ΑΔΕΒ; eşittir dolayısıyla AB, ΔΕ doğrusuna, ve ΑΔ, BE doğrusuna. Ama AB, ΑΔ doğrusuna eşittir. Dolaysısyla şu dördü ΒΑ, ΑΔ, ΔΕ ve ΕΒ birbirlerine eşittirler; eşkenardır dolayısıyla ΑΔΕΒ paralelkenarı.
I say then that it is also right-angled.	λέγω δή, ὅτι καὶ ὀρθογώνιον.	Şimdi iddia ediyorum ki aynı zamanda dik açılıdır.
For, since on the parallels AB and ΔΕ fell the STRAIGHT ΑΔ, therefore the angles ΒΑΔ and ΑΔΕ are equal to two RIGHTs. And ΒΑΔ is right; right therefore is ΑΔΕ. And of parallelogram areas the opposite sides and angles are equal to one another. Right therefore is either of the opposite angles ΑΒΕ and ΒΕΔ; right-angled therefore is ΑΔΕΒ. And it was shown also equilateral.	ἐπεὶ γὰρ εἰς παραλλήλους τὰς ΑΒ, ΔΕ εὐθεῖα ἐνέπεσεν ἡ ΑΔ, αἱ ἄρα ὑπὸ ΒΑΔ, ΑΔΕ γωνίαι δύο ὀρθαῖς ἴσαι εἰσίν. ὀρθὴ δὲ ἡ ὑπὸ ΒΑΔ· ορθὴ ἄρα καὶ ἡ ὑπὸ ΑΔΕ. τῶν δὲ παραλληλογράμμων χωρίων αἱ ἀπεναντίον πλευραί τε καὶ γωνίαι ἴσαι ἀλλήλαις εἰσίν· ὀρθὴ ἄρα καὶ ἑκατέρα τῶν ἀπεναντίον τῶν ὑπὸ ΑΒΕ, ΒΕΔ γωνιῶν· ὀρθογώνιον ἄρα ἐστὶ τὸ ΑΔΕΒ. ἐδείχθη δὲ καὶ ἰσόπλευρον.	Çünkü, AB ve ΔΕ paralellerinin üzerine düştüğünden ΑΔ doğrusu, eşittir dolaysıyla ΒΑΔ ve ΑΔΕ iki dik açıya. Ve ΒΑΔ diktir; diktir dolayısıyla ΑΔΕ. Ve paralelkenar alanların karşıt kenar ve açıları eşittir birbirlerine. Diktir dolayısıyla her bir karşıt açı ΑΒΕ ve ΒΕΔ; dik açılıdır dolayısıyla ΑΔΕΒ. Ve gösterilmişti ki eşkenardır da.
A square therefore it is; and it is on the STRAIGHT AB set up; —just what it was necessary to do.	Τετράγωνον ἄρα ἐστίν· καί ἐστιν ἀπὸ τῆς ΑΒ εὐθείας ἀναγεγραμμένον· ὅπερ ἔδει ποιῆσαι.	Bir karedir dolayısıyla o; ve o AB doğrusu üzerine kurulmuştur; —yapılması gereken tam buydu.



1.47

In right-angled triangles,	Ἐν τοῖς ὀρθογωνίοις τριγώνοις	Dik açılı üçgenlerde,
the square on the side that subtends the right angle	τὸ ἀπὸ τῆς τὴν ὀρθὴν γωνίαν ὑποτεινούσης πλευρᾶς τετράγωνον	dik açının gördüğü kenar üzerindeki kare
is equal	ἴσον ἐστὶ	eşittir
to the squares on the sides that contain the right angle.	τοῖς ἀπὸ τῶν τὴν ὀρθὴν γωνίαν περιεχουσῶν πλευρῶν τετραγώνοις.	dik açıyı içeren kenarların üzerindekilere.
Let be	Ἔστω	Verilmiş olsun
a right-angled triangle, ΑΒΓ,	τρίγωνον ὀρθογώνιον τὸ ΑΒΓ	dik açılı bir ΑΒΓ üçgeni
having the angle ΒΑΓ right.	ὀρθὴν ἔχον τὴν ὑπὸ ΒΑΓ γωνίαν·	ΒΑΓ açısı dik olan.
I say that	λέγω, ὅτι	İddia ediyorum ki
the square on ΓΒ	τὸ ἀπὸ τῆς ΒΓ τετράγωνον	ΓΒ üzerindeki kare
is equal	ἴσον ἐστὶ	eşittir
to the squares on ΒΑ and ΑΓ.	τοῖς ἀπὸ τῶν ΒΑ, ΑΓ τετραγώνοις.	ΒΑ ve ΑΓ üzerlerindeki karelere.
For, suppose there has been set up	Ἀναγεγράφθω γὰρ	Çünkü, kurulmuş olsun
on ΒΓ	ἀπὸ μὲν τῆς ΒΓ	ΒΓ üzerinde
a square, ΒΔΕΓ,	τετράγωνον τὸ ΒΔΕΓ,	bir ΒΔΕΓ karesi,
and on ΒΑ and ΑΓ,	ἀπὸ δὲ τῶν ΒΑ, ΑΓ	ve ΒΑ ile ΑΓ üzerlerinde,
ΗΒ and ΘΓ,	τὰ ΗΒ, ΘΓ,	ΗΒ ve ΘΓ,
and through Α,	καὶ διὰ τοῦ Α	ve Α noktasından,
parallel to either of ΒΔ and ΓΕ,	ὁποτέρᾳ τῶν ΒΔ, ΓΕ παράλληλος	ΒΔ ve ΓΕ doğrularına paralel olan,
suppose ΑΛ has been drawn;	ἤχθω ἡ ΑΛ·[1]	ΑΛ çizilmiş olsun;
and suppose have been joined	καὶ ἐπεζεύχθωσαν	ve birleştirilmiş olsun
ΑΔ and ΖΓ.	αἱ ΑΔ, ΖΓ.	ΑΔ ve ΖΓ.
And since right is	καὶ ἐπεὶ ὀρθή ἐστιν	Ve dik olduğundan
either of the angles ΒΑΓ and ΒΑΗ,	ἑκατέρα τῶν ὑπὸ ΒΑΓ, ΒΑΗ γωνιῶν,	ΒΑΓ ve ΒΑΗ açılarının her biri,
on some straight, ΒΑ,	πρὸς δή τινι εὐθείᾳ τῇ ΒΑ	bir ΒΑ doğrusunda,
to the point Α on it,	καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ Α	üzerindeki Α noktasına,
two straights, ΑΓ and ΑΗ,	δύο εὐθεῖαι αἱ ΑΓ, ΑΗ	ΑΓ ve ΑΗ doğruları,
not lying in the same parts,	μὴ ἐπὶ τὰ αὐτὰ μέρη κείμεναι	aynı tarafta kalmayan,
the adjacent angles	τὰς ἐφεξῆς γωνίας	bitişik açılar
make equal to two rights;	δυσὶν ὀρθαῖς ἴσας ποιοῦσιν·	oluştururlar eşit iki dik açıya;
on a straight therefore is ΓΑ with ΑΗ.	ἐπ᾽ εὐθείας ἄρα ἐστὶν ἡ ΓΑ τῇ ΑΗ.	bir doğrudadır dolayısısyla ΓΑ ile ΑΗ.
Then for the same [reason]	διὰ τὰ αὐτὰ δὴ	Sonra aynı nedenle
also ΒΑ with ΑΘ is on a straight.	καὶ ἡ ΒΑ τῇ ΑΘ ἐστιν ἐπ᾽ εὐθείας.	ΒΑ ile ΑΘ da bir doğrudadır.
And since equal is	καὶ ἐπεὶ ἴση ἐστὶν	Ve eşit olduğundan
angle ΔΒΓ to angle ΖΒΑ;	ἡ ὑπὸ ΔΒΓ γωνία τῇ ὑπὸ ΖΒΑ·	ΔΒΓ, ΖΒΑ açısına;
for either is right;	ὀρθὴ γὰρ ἑκατέρα·	her ikiside diktir;
let ΑΒΓ be added in common;	κοινὴ προσκείσθω ἡ ὑπὸ ΑΒΓ·	eklenmiş olsun ΑΒΓ her ikisine de;
therefore ΔΒΑ as a whole	ὅλη ἄρα ἡ ὑπὸ ΔΒΑ	dolayısıyla ΔΒΑ açısının tamamı
to ΖΒΓ as a whole	ὅλῃ τῇ ὑπὸ ΖΒΓ	ΖΒΓ açısının tamamına
is equal.	ἐστιν ἴση.	eşittir.
And since equal is	καὶ ἐπεὶ ἴση ἐστὶν	Ve eşit olduğundan
	ἡ μὲν ΔΒ τῇ ΒΓ,	ΔΒ, ΒΓ doğrusuna,

[1] Heiberg's text [1, p. 110] has Δ for Λ at this place and elsewhere (though not in the diagram). Probably this is a compositor's mistake, owing to the similarity in appearance of the two letters, especially in the font used.

ΔΒ to ΒΓ,
and ΖΒ to ΒΑ,
the two ΔΒ and ΒΑ
to the two ΖΒ and ΒΓ[2]
are equal,
either to either;
and angle ΔΒΑ
to angle ΖΒΓ
is equal;
therefore the base ΑΛ
to the base ΖΓ
[is] equal,
and the triangle ΑΒΔ
to the triangle ΖΒΓ
is equal;
and of the triangle ΑΒΔ
the parallelogram ΒΛ is double;
for they have the same base, ΒΛ,
and are in the same parallels,
ΒΔ and ΑΛ;
and of the triangle ΖΒΓ
the square ΗΒ is double;
for again they have the same base, ΖΒ,
and are in the same parallels,
ΖΒ and ΗΓ.
[And of equals,
the doubles are equal to one another.]
Equal therefore is
also the parallelogram ΒΛ
to the square ΗΒ.
Similarly then,
there being joined ΑΕ and ΒΚ,
it will be shown that
also the parallelogram ΓΛ
[is] equal to the square ΘΓ.
Therefore the square ΔΒΕΓ as a whole
to the two squares ΗΒ and ΘΓ
is equal.
Also is
the square ΒΔΕΓ set up on ΒΓ,
and ΗΒ and ΘΓ on ΒΑ and ΑΓ.
Therefore the square on the side ΒΓ
is equal
to the squares on the sides ΒΑ and ΑΓ.

Therefore in right-angled triangles
the square on the side subtending the right angle
is equal
to the squares on the sides subtending the right [angle];
—just what it was necessary to show.

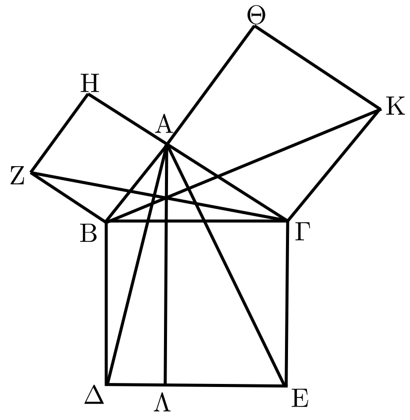
ἡ δὲ ΖΒ τῇ ΒΑ,
δύο δὴ αἱ ΔΒ, ΒΑ
δύο ταῖς ΖΒ, ΒΓ
ἴσαι εἰσὶν
ἑκατέρα ἑκατέρᾳ·
καὶ γωνία ἡ ὑπὸ ΔΒΑ
γωνίᾳ τῇ ὑπὸ ΖΒΓ
ἴση·
βάσις ἄρα ἡ ΑΔ
βάσει τῇ ΖΓ
[ἐστιν] ἴση,
καὶ τὸ ΑΒΔ τρίγωνον
τῷ ΖΒΓ τριγώνῳ
ἐστὶν ἴσον·
καί [ἐστι] τοῦ μὲν ΑΒΔ τριγώνου
διπλάσιον τὸ ΒΛ παραλληλόγραμμον·
βάσιν τε γὰρ τὴν αὐτὴν ἔχουσι τὴν ΒΔ
καὶ ἐν ταῖς αὐταῖς εἰσι παραλλήλοις
ταῖς ΒΔ, ΑΛ·
τοῦ δὲ ΖΒΓ τριγώνου
διπλάσιον τὸ ΗΒ τετράγωνον·
βάσιν τε γὰρ πάλιν τὴν αὐτὴν ἔχουσι
τὴν ΖΒ
καὶ ἐν ταῖς αὐταῖς εἰσι παραλλήλοις
ταῖς ΖΒ, ΗΓ.
[τὰ δὲ τῶν ἴσων
διπλάσια ἴσα ἀλλήλοις ἐστίν·]
ἴσον ἄρα ἐστὶ
καὶ τὸ ΒΛ παραλληλόγραμμον
τῷ ΗΒ τετραγώνῳ.
ὁμοίως δὴ
ἐπιζευγνυμένων τῶν ΑΕ, ΒΚ
δειχθήσεται
καὶ τὸ ΓΛ παραλληλόγραμμον
ἴσον τῷ ΘΓ τετραγώνῳ·
ὅλον ἄρα τὸ ΒΔΕΓ τετράγωνον
δυσὶ τοῖς ΗΒ, ΘΓ τετραγώνοις
ἴσον ἐστίν.
καί ἐστι
τὸ μὲν ΒΔΕΓ τετράγωνον ἀπὸ τῆς ΒΓ ἀναγραφέν,
τὰ δὲ ΗΒ, ΘΓ ἀπὸ τῶν ΒΑ, ΑΓ.
τὸ ἄρα ἀπὸ τῆς ΒΓ πλευρᾶς τετράγωνον
ἴσον ἐστὶ
τοῖς ἀπὸ τῶν ΒΑ, ΑΓ πλευρῶν τετραγώνοις.

Ἐν ἄρα τοῖς ὀρθογωνίοις τριγώνοις
τὸ ἀπὸ τῆς τὴν ὀρθὴν γωνίαν ὑποτεινούσης πλευρᾶς τετράγωνον
ἴσον ἐστὶ
τοῖς ἀπὸ τῶν τὴν ὀρθὴν [γωνίαν] περιεχουσῶν πλευρῶν τετραγώνοις·
ὅπερ ἔδει δεῖξαι.

ve ΖΒ, ΒΑ doğrusuna
ΔΒ ve ΒΑ ikilisi
ΖΒ ve ΒΓ ikilisine[3]
eşittirler,
her biri birine;
ve ΔΒΑ açısı
ΖΒΓ açısına
eşittir;
dolayısıyla ΑΛ tabanı
ΖΓ tabanına
eşittir,
ve ΑΒΔ üçgeni
ΖΒΓ üçgenine
eşittir;
ve ΑΒΔ üçgeninin
ΒΛ paralelkenarı iki katıdır;
aynı ΒΛ tabanları olduğu,
ve aynı
ΒΔ ve ΑΛ parallerinde oldukları için;
ve ΖΒΓ üçgeninin
ΗΒ karesi iki katıdır;
yine aynı
ΖΒ tabanları olduğu
ve aynı
ΖΒ ve ΗΓ parallerinde oldukları için.
[Ve eşitlerin,
iki katları birbirlerine eşittirler.]
Eşittir dolaysıyla
ΒΛ paralelkenarı da
ΗΒ karesine.
Şimdi benzer şekilde,
birleştirildiğinde ΑΕ ve ΒΚ,
gösterilecek ki
ΓΛ paralelkenarı da
eşittir ΘΓ karesine.
Dolayısıyla ΔΒΕΓ bir bütün olarak
ΗΒ ve ΘΓ iki karesine
eşittir.
Ayrıca
ΒΔΕΓ karesi ΒΓ üzerine kurulmuştur,
ve ΗΒ ve ΘΓ, ΒΑ ve ΑΓ üzerine.
Dolayısıyla ΒΓ kenarındaki kare
eşittir
ΒΑ ve ΑΓ kenarlarındaki karelere.

Dolayısıyla dik açılı üçgenlerde,
dik açının gördüğü kenar üzerindeki kare
eşittir
dik açıyı içeren kenarların üzerindekilere;
—gösterilmesi gereken tam buydu.

[2]Fitzpatrick considers this ordering of the two straight lines to be 'obviously a mistake'. But if it is a mistake, how could it have been made?



1.48

If of a triangle the square on one of the sides be equal to the squares on the remaining sides of the triangle, the angle contained by the two remaining sides of the triangle is right.	Ἐὰν τριγώνου τὸ ἀπὸ μιᾶς τῶν πλευρῶν τετράγωνον ἴσον ᾖ τοῖς ἀπὸ τῶν λοιπῶν τοῦ τριγώνου δύο πλευρῶν τετραγώνοις, ἡ περιεχομένη γωνία ὑπὸ τῶν λοιπῶν τοῦ τριγώνου δύο πλευρῶν ὀρθή ἐστιν.	Eğer bir üçgende bir kenarın üzerindeki kare eşitse üçgenin geriye kalan kenarlarındaki karelere, üçgenin geriye kalan kenarlarınca içerilen açı diktir.
For, of the triangle ΑΒΓ the square on the one side ΒΓ —suppose it is equal to the squares on the sides ΒΑ and ΑΓ.	Τριγώνου γὰρ τοῦ ΑΒΓ τὸ ἀπὸ μιᾶς τῆς ΒΓ πλευρᾶς τετράγωνον ἴσον ἔστω τοῖς ἀπὸ τῶν ΒΑ, ΑΓ πλευρῶν τετραγώνοις·	Çünkü, ΑΒΓ üçgeninin bir ΒΓ kenarındaki karesi —varsayılsın eşit ΒΑ ve ΑΓ kenarlarındaki karelere.
I say that right is the angle ΒΑΓ.	λέγω, ὅτι ὀρθή ἐστιν ἡ ὑπὸ ΒΑΓ γωνία.	İddia ediyorum ki ΒΑΓ açısı diktir.
For, suppose has been drawn from the point Α to the STRAIGHT ΑΓ at RIGHTS ΑΔ, and let be laid down equal to ΒΑ ΑΔ, and suppose ΔΓ has been joined.	Ἤχθω γὰρ ἀπὸ τοῦ Α σημείου τῇ ΑΓ εὐθείᾳ πρὸς ὀρθὰς ἡ ΑΔ καὶ κείσθω τῇ ΒΑ ἴση ἡ ΑΔ, καὶ ἐπεζεύχθω ἡ ΔΓ.	Çünkü, çizilmiş olsun Α noktasından ΑΓ doğrusuna dik açılarda ΑΔ, ve yerleştirilmiş olsun ΒΑ doğrusuna eşit ΑΔ, ve ΔΓ birleştirilmiş olsun.
Since equal is ΔΑ to ΑΒ, equal is also the square on ΔΑ to the square on ΑΒ. Let be added in common the square on ΑΓ; therefore the squares on ΔΑ and ΑΓ are equal to the squares on ΒΑ and ΑΓ. But those on ΔΑ and ΑΓ are equal to that on ΔΓ; for right is the angle ΔΑΓ; and those on ΒΑ and ΑΓ are equal	ἐπεὶ ἴση ἐστὶν ἡ ΔΑ τῇ ΑΒ, ἴσον ἐστὶ καὶ τὸ ἀπὸ τῆς ΔΑ τετράγωνον τῷ ἀπὸ τῆς ΑΒ τετραγώνῳ. κοινὸν προσκείσθω τὸ ἀπὸ τῆς ΑΓ τετράγωνον· τὰ ἄρα ἀπὸ τῶν ΔΑ, ΑΓ τετράγωνα ἴσα ἐστὶ τοῖς ἀπὸ τῶν ΒΑ, ΑΓ τετραγώνοις. ἀλλὰ τοῖς μὲν ἀπὸ τῶν ΔΑ, ΑΓ ἴσον ἐστὶ τὸ ἀπὸ τῆς ΔΓ· ὀρθὴ γάρ ἐστιν ἡ ὑπὸ ΔΑΓ γωνία· τοῖς δὲ ἀπὸ τῶν ΒΑ, ΑΓ ἴσον ἐστὶ	Eşit olduğundan ΔΑ, ΑΒ kenarına, eşittir ΔΑ üzerindeki kare de ΑΒ üzerindeki kareye. Eklenmiş olsun ortak ΑΓ üzerindeki kare; dolayısıyla ΔΑ ve ΑΓ üzerlerindeki kareler eşittir ΒΑ ve ΑΓ üzerlerindeki karelere. Ama ΔΑ ve ΑΓ kenarları üzerlerindekiler eşittir ΔΓ üzerlerindekine; ΔΑΓ açısı dik olduğundan;

to that on ΒΓ;
for it is supposed;
therefore the square on ΔΓ
is equal
to the square on ΒΓ;
so that the side ΔΓ
to the side ΒΓ
is equal;
and since equal is ΔΑ to ΑΒ,
and common [is] ΑΓ,
the two ΔΑ and ΑΓ
to the two ΒΑ and ΑΓ
are equal;
and the base ΔΑ
to the base ΒΓ
[is] equal;
therefore the angle ΔΑΓ
to the angle ΒΑΓ
[is] equal.
And right [is] ΔΑΓ;
right therefore [is] ΒΑΓ.

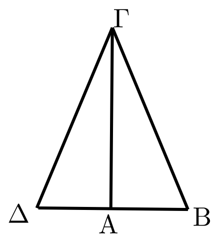
τὸ ἀπὸ τῆς ΒΓ·
ὑπόκειται γάρ·
τὸ ἄρα ἀπὸ τῆς ΔΓ τετράγωνον
ἴσον ἐστὶ
τῷ ἀπὸ τῆς ΒΓ τετραγώνῳ·
ὥστε καὶ πλευρὰ
ἡ ΔΓ τῇ ΒΓ
ἐστιν ἴση·
καὶ ἐπεὶ ἴση ἐστὶν ἡ ΔΑ τῇ ΑΒ,
κοινὴ δὲ ἡ ΑΓ,
δύο δὴ αἱ ΔΑ, ΑΓ
δύο ταῖς ΒΑ, ΑΓ
ἴσαι εἰσίν·
καὶ βάσις ἡ ΔΓ
βάσει τῇ ΒΓ
ἴση·
γωνία ἄρα ἡ ὑπὸ ΔΑΓ
γωνίᾳ τῇ ὑπὸ ΒΑΓ
[ἐστιν] ἴση.
ὀρθὴ δὲ ἡ ὑπὸ ΔΑΓ·
ὀρθὴ ἄρα καὶ ἡ ὑπὸ ΒΑΓ.

ve ΒΑ ile ΑΓ üzerlerindekiler
eşittirler
ΒΓ üzerlerindekine;
çünkü varsayıldı;
dolayısıyla ΔΓ üzerlerindeki
eşittir
ΒΓ üzerlerindeki kareye;
böylece ΔΓ kenarı
ΒΓ kenarına
eşittir;
ve ΔΑ, ΑΒ kenarına eşit olduğundan,
ve ΑΓ ortak,
ΔΑ ve ΑΓ ikilisi
ΒΑ ve ΑΓ ikilisine
eşittirler;
ve ΔΑ tabanı
ΒΓ tabanına
eşittir;
dolayısıyla ΔΑΓ açısı
ΒΑΓ açısına
eşittir.
Ve ΔΑΓ diktir;
diktir dolayısıyla ΒΑΓ.

If, therefore, of a triangle,
the square on one of the sides
be equal
to the squares on the remaining two sides,
the angle contained
by the remaining two sides of the triangle
is right;
—just what it was necessary to show.

Ἐὰν ἀρὰ τριγώνου
τὸ ἀπὸ μιᾶς τῶν πλευρῶν τετράγωνον
ἴσον ᾖ
τοῖς ἀπὸ τῶν λοιπῶν τοῦ τριγώνου δύο πλευρῶν τετραγώνοις,
ἡ περιεχομένη γωνία
ὑπὸ τῶν λοιπῶν τοῦ τριγώνου δύο πλευρῶν
ὀρθή ἐστιν·
ὅπερ ἔδει δεῖξαι.

Eğer dolayısıyla bir üçgende
bir kenarın üzerindeki kare
eşitse
üçgenin geriye kalan kenarlarındaki karelere,
üçgenin geriye kalan kenarlarınca içerilen
açı
diktir;
—gösterilmesi gereken tam buydu.



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