Book I of the Elements ΣΤΟΙΧΕΙΩΝ Α Öğelerin Birinci Kitabı

Euclid ΕΥΚΛΕΙΔΟΣ Öklid

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Introduction

1.1 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 §1.3 below—would appear to be the common metonym.)

1.2 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 1.1.) 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 1.1: Greek text, coded for LaTeX

1.3 Analysis

[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/`

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
>
> - **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.

1.4 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.

[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.*

[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 1.2: The Greek alphabet

1.4.1 Writing

The Greek alphabet, in Table 1.2, 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].

1.4.2 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),

[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.*

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 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 1.3.

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	μέρων
	dative	γραμμαίς	γωνίαις	κύκλοις	τριγώνοις	μέρεσι
	accusative	γραμμάς	γωνίας	κύκλους	τρίγωνα	μέρη
		line	*angle*	*circle*	*triangle*	*part*

Table 1.3: Declension of Greek nouns

1.4.3 The definite 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 1.4.

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 distinguish 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

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

[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.

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

	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 1.4: The Greek article

ἡ περιεχομένη ὑπὸ τῶν AB, BΓ ευθείων γραμμῶν γωνία 'the bounded-by-the-AB-BΓ-straight-lines angle'.[13] In the same proposition, the form γωνία ἡ ὑπὸ ABΓ appears (actually γωνία ἡ ὑπὸ BZΓ), with no obvious distinction in meaning. (Each position of [ἡ] ὑπὸ ABΓ is called attributive by Smyth.) For short, Euclid may say just ἡ ὑπὸ ABΓ 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 1.5.

1.4.4 Prepositions

In the example in Table 1.5, 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 1.5 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 1.6. 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 AB τῇ ΔE 'because AB is equal to ΔE'.

The preposition διά is also used with the genitive case, 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 AEK τρίγωνον μετὰ τοῦ KHΓ ἴσον ἐστὶ τῷ AΘK τριγώνῳ μετὰ τοῦ KZΓ 'Triangle AEK, with [triangle] KHΓ, is equal to triangle AΘK with [triangle] KZΓ'.

[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.

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 1.5: Nesting of Greek adjective phrases

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 ἰσού: '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.

1.4.5 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.

	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 1.6: Greek prepositions

1.5 Translation

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' godlike 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).

Chapter 2

Giriş

2.1 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.

2.2 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[1] 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

[1] 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].

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 δὴ kelimeleriyle başlar. Burada δεῖ, 'gereklidir' , δή ise 'şimdi' anlamındadır.
(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.

2.3 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 2.1: Yunan alfabesi

Chapter 3

‘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, standing on a STRAIGHT, the adjacent angles	Ὅταν δὲ εὐθεῖα ἐπ᾽ εὐθεῖαν σταθεῖσα τὰς ἐφεξῆς γωνίας	Bir doğru başka bir doğrunun üzerine yerleşip birbirine eşit bitişik açılar oluşturduğunda,

[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.

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]	ἴσας ἀλλήλαις ποιῇ, ὀρθὴ ἑκατέρα τῶν ἴσων γωνιῶν ἐστι, καὶ ἡ ἐφεστηκυῖα εὐθεῖα κάθετος καλεῖται, ἐφ᾽ ἣν ἐφέστηκεν.	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, 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 çevresinde 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 from any point to any point a straight line to draw.	Ἠιτήσθω ἀπὸ παντὸς σημείου ἐπὶ πᾶν σημεῖον εὐθεῖαν γραμμὴν ἀγαγεῖν.	Herhangi bir noktadan herhangi bir noktaya bir doğru çizilmesi.
Also, a bounded STRAIGHT continuously in a straight to extend.	Καὶ πεπερασμένην εὐθεῖαν κατὰ τὸ συνεχὲς ἐπ᾽ εὐθείας ἐκβαλεῖν.	Sonlu bir doğrunun kesiksiz şekilde sonlu uzatılması.
Also, to any center and distance a circle to draw.	Καὶ παντὶ κέντρῳ καὶ διαστήματι κύκλον γράφεσθαι.	Her merkez ve uzunluk için bir daire çizilmesi.
Also, all right angles equal to one another to be.	Καὶ πάσας τὰς ὀρθὰς γωνίας ἴσας ἀλλήλαις εἶναι.	Bütün dik açıların bir birine eşit olduğu.
Also, if in two straight lines falling the interior angles to the same parts less than two RIGHTs make, the two STRAIGHTs, extended to infinity, fall together, to which parts are the less than two RIGHTs.	Καὶ ἐὰν εἰς δύο εὐθείας εὐθεῖα ἐμπίπτουσα τὰς ἐντὸς καὶ ἐπὶ τὰ αὐτὰ μέρη γωνίας δύο ὀρθῶν ἐλάσσονας ποιῇ, ἐκβαλλομένας τὰς δύο εὐθείας ἐπ᾽ ἄπειρον συμπίπτειν, ἐφ᾽ ἃ μέρη εἰσὶν αἱ τῶν δύο ὀρθῶν ἐλάσσονες.	İki doğruyu kesen bir doğrunun aynı tarafta oluşturduğu iç açılar iki dik açıdan küçükse, bu iki doğrunun, sınırsızca uzatıldıklarında açıların iki dik açıdan küçük olduğu tarafta 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.

3.1

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 Α διαστήματι δὲ τῷ ΑΒ κύκλος γεγράφθω ὁ ΒΓΔ, καὶ πάλιν κέντρῳ μὲν τῷ Β διαστήματι δὲ τῷ ΒΑ κύκλος γεγράφθω ὁ ΑΓΕ, καὶ ἀπὸ τοῦ Γ σημείου, καθ᾽ ὃ τέμνουσιν ἀλλήλους οἱ κύκλοι, ἐπί τὰ Α, Β 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 Α σημεῖον κέντρον ἐστὶ τοῦ ΓΔΒ κύκλου, ἴση ἐστὶν ἡ ΑΓ τῇ ΑΒ· πάλιν, ἐπεὶ τὸ Β σημεῖον κέντρον ἐστὶ τοῦ ΓΑΕ κύκλου, ἴση ἐστὶν ἡ ΒΓ τῇ ΒΑ.	A noktası ΓΔΒ çemberinin merkezi olduğu için, ΑΓ, AB doğrusuna eşittir. Yine 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 §1.3). 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.

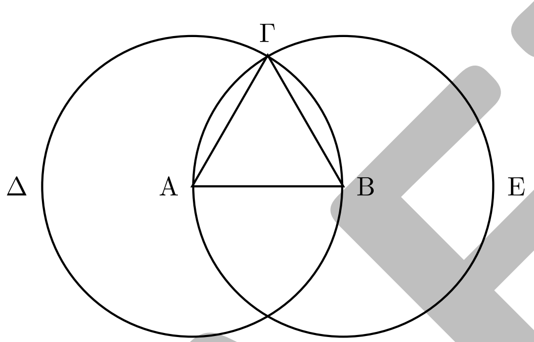
[2] The Greek form of the enunciation here is an infinitive clause, and the subject of such a clause is generally in the accusative case [16, ¶1972, p. 438]. In English, an infinitive clause with expressed subject (as here) is always preceded by 'for' [7, 14.1.3, p. 1178]. Normally such a clause, in 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 ΓA was shown equal to AB;	ἐδείχθη δὲ καὶ ἡ ΓΑ τῇ ΑΒ ἴση·	Ve ΓA doğrusunun, AB doğrusuna eşit olduğu gösterilmişti.
therefore either of ΓA and ΓB to AB is equal.	ἑκατέρα ἄρα τῶν ΓΑ, ΓΒ τῇ ΑΒ ἐστιν ἴση.	O zaman ΓA, ΓB doğrularının her biri AB doğrusuna eşittir.
But equals to the same are also equal to one another;	τὰ δὲ τῷ αὐτῷ ἴσα καὶ ἀλλήλοις ἐστὶν ἴσα·	Ama aynı şeye eşit olanlar birbirine eşittir.
therefore also ΓA is equal to ΓB.	καὶ ἡ ΓΑ ἄρα τῇ ΓΒ ἐστιν ἴση·	O zaman ΓA, ΓB doğrusuna eşittir.
Therefore the three ΓA, AB, and BΓ are equal to one another.	αἱ τρεῖς ἄρα αἱ ΓΑ, ΑΒ, ΒΓ ἴσαι ἀλλήλαις εἰσίν.	O zaman o üç doğru, ΓA, AB, BΓ, birbirine eşittir.
Equilateral therefore is triangle ABΓ.	Ἰσόπλευρον ἄρα ἐστὶ τὸ ΑΒΓ τρίγωνον.	Eşkenardır dolayısıyla, ABΓ üçgeni
Also, it has been constructed on the given bounded STRAIGHT AB;	καὶ συνέσταται ἐπὶ τῆς δοθείσης εὐθείας πεπερασμένης τῆς ΑΒ.[6]	ve inşa edilmiştir verilmiş sınırlanmış, AB doğrusuna;
—just what it was necessary to do.	ὅπερ ἔδει ποιῆσαι.	— yapılması gereken tam buydu.

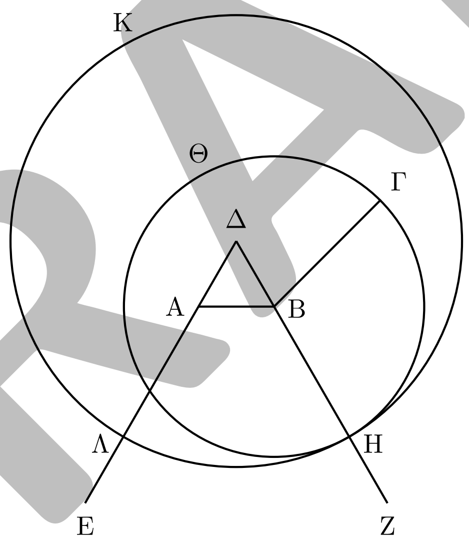


3.2

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 A, and the given STRAIGHT, BΓ.	Ἔστω τὸ μὲν δοθὲν σημεῖον τὸ Α, ἡ δὲ δοθεῖσα εὐθεῖα ἡ ΒΓ·	Verilmiş nokta A olsun, verilmiş doğru BΓ.
It is necessary then at the point A equal to the given STRAIGHT BΓ for a STRAIGHT to be placed.	δεῖ δὴ πρὸς τῷ Α σημείῳ τῇ δοθείσῃ εὐθείᾳ τῇ ΒΓ ἴσην εὐθεῖαν θέσθαι.	Gereklidir A noktasına, BΓ doğrusuna eşit olan bir doğrunun konulması.
For, suppose there has been joined from the point A to the point B a STRAIGHT, AB,	Ἐπεζεύχθω γὰρ ἀπὸ τοῦ Α σημείου ἐπί τὸ Β σημεῖον εὐθεῖα ἡ ΑΒ,	Çünkü,birleştirilmiş olsun A noktasından B noktasına, AB doğrusu ,
and there has been constructed on it an equilateral triangle, ΔAB,	καὶ συνεστάτω ἐπ᾽ αὐτῆς τρίγωνον ἰσόπλευρον τὸ ΔΑΒ,	ve bu doğru üzerine inşa edilmiş olsun eşkenar üçgen ΔAB ,
and suppose there have been extended on a STRAIGHT[1] with ΔA and ΔB the STRAIGHTs AE and BZ,	καὶ ἐκβεβλήσθωσαν ἐπ᾽ εὐθείας ταῖς ΔΑ, ΔΒ εὐθεῖαι αἱ ΑΕ, ΒΖ,	ve uzatılmış olsun, ΔA, ΔB doğrularından AE, BZ doğruları
and to the center B at distance BΓ suppose a circle has been drawn, ΓHΘ,	καὶ κέντρῳ μὲν τῷ Β διαστήματι δὲ τῷ ΒΓ κύκλος γεγράφθω ὁ ΓΗΘ,	ve B merkezine, BΓ uzaklığında, çizilmiş olsun, ΓHΘ çemberi
and again to the center Δ at distance ΔH suppose a circle has been drawn,	καὶ πάλιν κέντρῳ τῷ Δ καὶ διαστήματι τῷ ΔΗ κύκλος γεγράφθω	ve yine Δ merkezine, ΔH uzaklığında çizilmiş olsun, HKΛ 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 biri ΒΗ doğrusuna eşittir.
is equal.	ἐστιν ἴση.	
But equals to the same	τὰ δὲ τῷ αὐτῷ ἴσα	
also are equal to one another.	καὶ ἀλλήλοις ἐστὶν ἴσα·	Ama aynı şeye eşit olanlar birbirine 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.



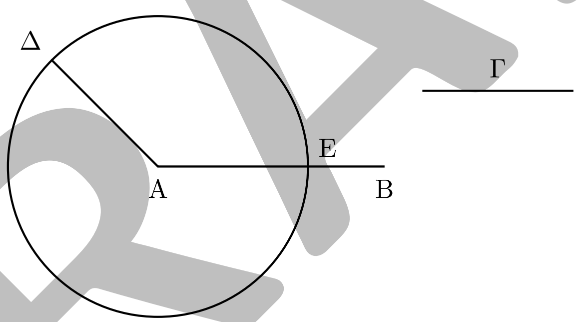
3·3

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,	τῇ ἐλάσσονι τῇ Γ ἴσην	daha küçük olan Γ doğrusuna eşit olan
to take away a STRAIGHT.	εὐθεῖαν ἀφελεῖν.	bir doğru kesmek.
Let there be laid down	Κείσθω	Konulsun
at the point A,	πρὸς τῷ Α σημείῳ	A noktasına
equal to the line Γ,	τῇ Γ εὐθείᾳ ἴση	Γ doğrusuna eşit olan
AΔ;	ἡ ΑΔ·	AΔ doğrusu.
and to center A	καὶ κέντρῳ μὲν τῷ Α	Ve A merkezine
at distance AΔ	διαστήματι δὲ τῷ ΑΔ	AΔ uzaklığında olan
suppose circle ΔEZ has been drawn.	κύκλος γεγράφθω ὁ ΔΕΖ.	ΔEZ çemberi çizilmiş olsun.
And since the point A	Καὶ ἐπεὶ τὸ Α σημεῖον	Ve A noktası
is the center of the circle ΔEZ,	κέντρον ἐστὶ τοῦ ΔΕΖ κύκλου,	ΔEZ çemberinin merkezi olduğu için,
equal is AE to AΔ.	ἴση ἐστὶν ἡ ΑΕ τῇ ΑΔ·	AE, AΔ doğrusuna eşittir.
But Γ to AΔ is equal.	ἀλλὰ καὶ ἡ Γ τῇ ΑΔ ἐστιν ἴση.	Ama Γ, AΔ doğrusuna eşittir.
Therefore either of AE and Γ	ἑκατέρα ἄρα τῶν ΑΕ, Γ	Dolayısıyla AE, Γ doğrularının her biri
is equal to AΔ;	τῇ ΑΔ ἐστιν ἴση·	AΔ doğrusuna eşittir.
and so AE is equal to Γ.	ὥστε καὶ ἡ ΑΕ τῇ Γ ἐστιν ἴση.	Sonuç olarak,
		AE, Γ doğrusuna eşittir.
Therefore, two unequal STRAIGHTS being given, AB and Γ,	Δύο ἄρα δοθεισῶν εὐθειῶν ἀνίσων τῶν ΑΒ, Γ	Dolayısıyla iki eşit olmayan AB, Γ doğrusu verilmiş ise,
from the greater, AB,	ἀπὸ τῆς μείζονος τῆς ΑΒ	daha büyük olan AB doğrusundan
an equal to the less, Γ,	τῇ ἐλάσσονι τῇ Γ ἴση	daha küçük olan Γ doğrusuna eşit olan
has been taken away, [namely] AE;	ἀφῄρηται ἡ ΑΕ·	AE doğrusu kesilmişti;
—just what it was necessary to do.	ὅπερ ἔδει ποιῆσαι.	—just what it was necessary to do.



3·4

If two triangles	Ἐὰν δύο τρίγωνα	Eğer iki üçgende
two sides	τὰς δύο πλευρὰς	iki kenar
to two sides	[ταῖς] δυσὶ πλευραῖς	iki kenara
have equal,[1]	ἴσας ἔχῃ	eşit olursa
either [side] to either,[2]	ἑκατέραν ἑκατέρᾳ	(her biri birine)
and angle to angle have equal,	καὶ τὴν γωνίαν τῇ γωνίᾳ ἴσην ἔχῃ	ve açı açıya eşit olursa
—that which is by the equal STRAIGHTS[3]	τὴν ὑπὸ τῶν ἴσων εὐθειῶν	(yani, eşit doğrular tarafından
	περιεχομένην,	içerilen),
contained,	καὶ τὴν βάσιν τὴ βάσει	hem taban tabana
also[4] base to base	ἴσην ἕξει,	eşit olacak,
they will have equal,	καὶ τὸ τρίγωνον τῷ τριγώνῳ	hem üçgen üçgene
and the triangle to the triangle	ἴσον ἔσται,	eşit olacak,
will be equal,	καὶ αἱ λοιπαὶ γωνίαι	hem de geriye kalan açılar
and the remaining angles	ταῖς λοιπαῖς γωνίαις	geriye kalan açılara
to the remaining angles	ἴσαι ἔσονται	eşit olacak,
will be equal,	ἑκατέρα ἑκατέρᾳ,	her biri birine,
either to either,	ὑφ᾽ ἃς αἱ ἴσαι πλευραὶ ὑποτείνουσιν.	(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 yerleşecekΕ 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 ΔΕΖ 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 ΔΕΖ
and ΑΓΒ to ΔΖΕ.

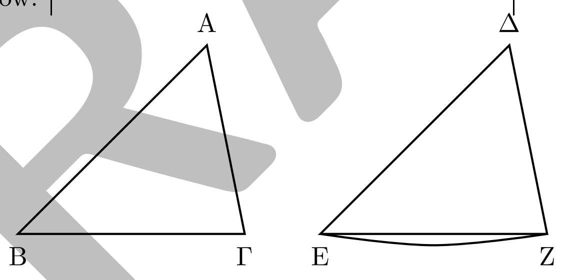
ἐπὶ ὅλον τὸ ΔΕΖ τρίγωνον
ἐφαρμόσει
καὶ ἴσον αὐτῷ ἔσται,
καὶ αἱ λοιπαὶ γωνίαι
ἐπὶ τὰς λοιπὰς γωνίας
ἐφαρμόσουσι
καὶ ἴσαι αὐταῖς ἔσονται,
ἡ μὲν ὑπὸ ΑΒΓ τῇ ὑπὸ ΔΕΖ
ἡ δὲ ὑπὸ ΑΓΒ τῇ ὑπὸ ΔΖΕ.

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



3·5

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 ΑΒ to side ΑΓ,
and suppose have been extended
on a STRAIGHT with ΑΒ 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;
ΑΒ kenarı eşit olan ΑΓ kenarına,
ve varsayılsın ΒΔ ve ΓΕ doğrularının uzatılmış olduğu, ΑΒ 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.

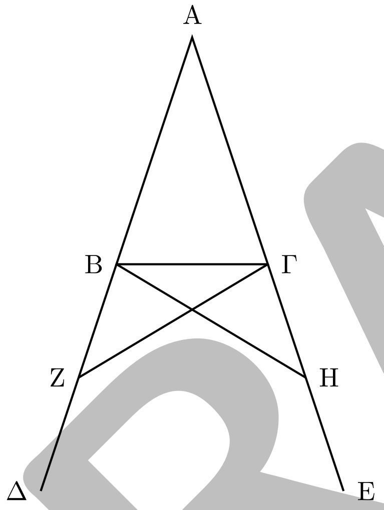
Çünkü, kabul edelim ki, seçilmiş olsun,
rastgele bir Ζ noktası ΒΔ üzerinnde,
ve ΑΗ, büyük olan ΑΕ doğrusundan küçük olan ΑΖ doğrusunun kesilmişi olsun,
ve ΖΓ ile ΗΒ birleştirilmiş olsun.

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.	ὅλῃ 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.



3.6

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 açısı 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, AΓ,
an equal, ΔB,
and there has been joined ΔΓ.

ἀπὸ τῆς μείζονος τῆς AB
τῇ ἐλάττονι τῇ AΓ
ἴση ἡ ΔB,
καὶ ἐπεζεύχθω ἡ ΔΓ.

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

Since then ΔB is equal to AΓ,
and BΓ is common,
so the two ΔB and BΓ
to the two AΓ and BΓ
are equal,
either to either,
and angle ΔBΓ
to angle AΓB
is equal;
therefore the base ΔΓ to the base AB
is equal,
and triangle ΔBΓ to triangle AΓB
will be equal,
the less to the greater;
which is absurd.
therefore AB is not unequal to AΓ;
therefore it is equal.

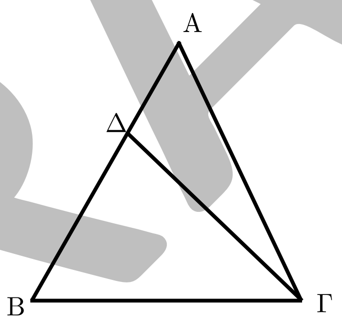
Ἐπεὶ οὖν ἴση ἐστὶν ἡ ΔB τῇ AΓ
κοινὴ δὲ ἡ BΓ,
δύο δὴ αἱ ΔB, BΓ
δύο ταῖς AΓ, ΓB
ἴσαι εἰσὶν
ἑκατέρα ἑκατέρᾳ,
καὶ γωνία ἡ ὑπὸ ΔBΓ
γωνίᾳ τῇ ὑπὸ AΓB
ἐστιν ἴση·
βάσις ἄρα ἡ ΔΓ βάσει τῇ AB
ἴση ἐστίν,
καὶ τὸ ΔBΓ τρίγωνον τῷ AΓB τριγώνῳ
ἴσον ἔσται,
τὸ ἔλασσον τῷ μείζονι·
ὅπερ ἄτοπον·
οὐκ ἄρα ἄνισός ἐστιν ἡ AB τῇ AΓ·
ἴση ἄρα.

O zaman ΔB eşittir AΓ kenarına,
ve BΓ ortaktır,
böylece ΔB, BΓ ikilisi eşittirler AΓ, BΓ ikilisinin,
her biri birine,
ve ΔBΓ açısı eşittir AΓB açısına;
dolayısıyla ΔΓ tabanı eşittir AB tabanına,
ve ΔBΓ üçgeni eşit olacak AΓB üçgenine,
daha küçük daha büyüğe;
ki bu saçmadır.
dolayısıyla AB değildir eşit değil AΓ 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.



3·7

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,
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 AB

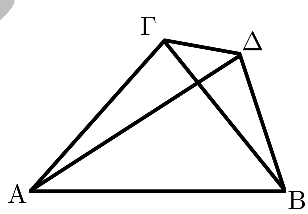
Çünkü eğer mümkünse,
aynı AB doğrusunda

[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,	δύο ταῖς αὐταῖς εὐθείαις ταῖς ΑΓ, ΓΒ	verilmiş iki ΑΓ, ΓΒ doğrusuna
two other STRAIGHTS ΑΔ, ΔΒ,	ἄλλαι δύο εὐθεῖαι αἱ ΑΔ, ΔΒ	eşit başka iki ΑΔ, ΔΒ doğrusu
equal	ἴσαι	her biri birine
either to either	ἑκατέρα ἑκατέρᾳ	—diyelim inşa edilmiş olsunlar
suppose have been constructed[4]	συνεστάτωσαν	bir ve başka bir noktaya
to one and another point	πρὸς ἄλλῳ καὶ ἄλλῳ σημείῳ	Γ ve Δ,
Γ and Δ,	τῷ τε Γ καὶ Δ	aynı tarafta,
to the same parts,	ἐπὶ τὰ αὐτὰ μέρη	aynı uçları olan,
having the same extremities,	τὰ αὐτὰ πέρατα ἔχουσαι,	şöyle ki ΓΑ eşit olmalı ΔΑ doğrusuna,
so that ΓΑ is[5] equal to ΔΑ,	ὥστε ἴσην εἶναι τὴν μὲν ΓΑ τῇ ΔΑ	aynı Α ucuna sahip olan,
having the same extremity as it, Α,	τὸ αὐτὸ πέρας ἔχουσαν αὐτῇ τὸ Α,	ve ΓΒ, ΔΒ doğrusuna,
and ΓΒ to ΔΒ,	τὴν δὲ ΓΒ τῇ ΔΒ	aynıΒ ucuna sahip olan,
having the same extremity as it, Β,	τὸ αὐτὸ πέρας ἔχουσαν αὐτῇ τὸ Β,	ve ΓΔ birleştirilmiş olsun.
and suppose there has been joined	καὶ ἐπεζεύχθω	
ΓΔ.	ἡ ΓΔ.	
Because equal is ΑΓ to ΑΔ,	Ἐπεὶ οὖν ἴση ἐστὶν ἡ ΑΓ τῇ ΑΔ,	Çünkü ΑΓ eşittir ΑΔ doğrusuna,
equal is	ἴση ἐστὶ	böylece ΑΓΔ eşittir ΑΔΓ açısına ;
also angle ΑΓΔ to ΑΔΓ;	καὶ γωνία ἡ ὑπὸ ΑΓΔ τῇ ὑπὸ ΑΔΓ·	dolayısıyla ΑΔΓ büyüktür ΔΓΒ
Greater therefore [is]	μείζων ἄρα	açısından;
ΑΔΓ than[6] ΔΓΒ;[7]	ἡ ὑπὸ ΑΔΓ τῆς ὑπὸ ΔΓΒ·	dolayısıyla ΓΔΒ çok daha büyüktür
by much, therefore, [is]	πολλῷ ἄρα	ΔΓΒ açısından.
ΓΔΒ greater than ΔΓΒ.	ἡ ὑπὸ ΓΔΒ μείζων ἐστί τῆς ὑπὸ ΔΓΒ.	Üstelik ΓΒ eşit olduğu için ΔΒ
Moreover, since equal is ΓΒ to ΔΒ,	πάλιν ἐπεὶ ἴση ἐστὶν ἡ ΓΒ τῇ ΔΒ,	doğrusuna,
equal is also	ἴση ἐστὶ καὶ	ΓΔΒ açısı eşittir ΔΓΒ açısına.
angle ΓΔΒ to angle ΔΓΒ.	γωνία ἡ ὑπὸ ΓΔΒ γωνίᾳ τῇ ὑπὸ ΔΓΒ.	Ama ondan çok daha büyük olduğu
But it was also shown than it	ἐδείχθη δὲ αὐτῆς καὶ	gösterilmişti;
much greater;	πολλῷ μείζων·	ki bu saçmadır.
which is absurd.	ὅπερ ἐστὶν ἀδύνατον.	
Not, therefore,	Οὐκ ἄρα	Şöyle olmaz, dolayısıyla; aynı doğru
on the same STRAIGHT,	ἐπὶ τῆς αὐτῆς εὐθείας	üzerinde,
to the same two STRAIGHTs,	δύο ταῖς αὐταῖς εὐθείαις	verilmiş iki doğruya,
two other STRAIGHTS	ἄλλαι δύο εὐθεῖαι	iki başka doğru, eşit,
[which are] equal,	ἴσαι	her biri birine,
either to either,	ἑκατέρα ἑκατέρᾳ	inşa edilecek
will be constructed	συσταθήσονται	başka bir noktaya
to one and another point	πρὸς ἄλλῳ καὶ ἄλλῳ σημείῳ	aynı tarafta
to the same parts	ἐπὶ τὰ αὐτὰ μέρη	aynı uçları olan
having the same extremities	τὰ αὐτὰ πέρατα ἔχουσαι	başlangıçtaki doğrularla.
as the original lines;	ταῖς ἐξ ἀρχῆς εὐθείαις·	— gösterilmesi gereken tam buydu.
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	



[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, textbfthan 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.

3.8

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.

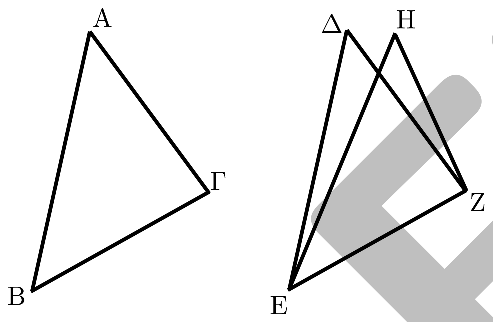
For, there being applied
triangle ΑΒΓ
to triangle ΔΕΖ,
and there being placed
the point Β on the point Ε,
and the STRAIGHT ΒΓ on ΕΖ,
also the point Γ will apply to Ζ,
by the equality of ΒΓ to ΕΖ.
Then, ΒΓ applying to ΕΖ,
also will apply
ΒΑ and ΓΑ to ΕΔ and ΔΖ.
For if base ΒΓ to the base ΕΖ
apply,
and 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 on 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 kayarsa,
ΕΗ veΗΖ 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 ΕΔΖ	ἐπὶ γωνίαν τὴν ὑπὸ ΕΔΖ	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.	



3·9

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, ΒΑΓ.
ΒΑΓ.	ἡ ὑπὸ ΒΑΓ.	

Then it is necessary	δεῖ δὴ	Şimdi gereklidir
to cut it in two.	αὐτὴν δίχα τεμεῖν.	onun ikiye kesilmesi.

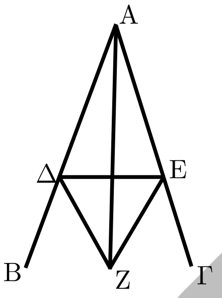
Suppose there has been chosen	Εἰλήφθω	Diyelim seçilmiş olsun
on ΑΒ at random a point Δ,	ἐπὶ τῆς ΑΒ τυχὸν σημεῖον τὸ Δ,	ΑΒ üzerinde rastgele bir nokta, Δ,
and there has been taken from ΑΓ	καὶ ἀφῃρήσθω ἀπὸ τῆς ΑΓ	ve kesilmiş olsun ΑΓ doğrusundan
ΑΕ, equal to ΑΔ,	τῇ ΑΔ ἴση ἡ ΑΕ,	ΑΕ, eşit olan ΑΔ doğrusuna,
and ΔΕ has been joined,	καὶ ἐπεζεύχθω ἡ ΔΕ,	ve ΔΕ birleştirilmiş olsun,
and there has been constructed on ΔΕ	καὶ συνεστάτω ἐπὶ τῆς ΔΕ	ve inşa edilmiş olsun ΔΕ üzerinde
an equilateral triangle, ΔΕΖ,	τρίγωνον ἰσόπλευρον τὸ ΔΕΖ,	bir eşkenar üçgen, ΔΕΖ,
and ΑΖ has been joined.	καὶ ἐπεζεύχθω ἡ ΑΖ·	ve ΑΖ birleştirilmiş olsun.

I say that	λέγω, ὅτι	İddia ediyorum ki
angle ΒΑΓ has been cut in two	ἡ ὑπὸ ΒΑΓ γωνία δίχα τέτμηται	ΒΑΓ açısı ikiye kesilmiş oldu
by the STRAIGHT ΑΖ.	ὑπὸ τῆς ΑΖ εὐθείας.	ΑΖ doğrusu tarafından.
For, because ΑΔ is equal to ΑΕ,	Ἐπεὶ γὰρ ἴση ἐστὶν ἡ ΑΔ τῇ ΑΕ,	Çünkü, olduğundan, ΑΔ eşit ΑΕ kenarına,
and ΑΖ is common,	κοινὴ δὲ ἡ ΑΖ,	
then the two, ΔΑ and ΑΖ	δύο δὴ αἱ ΔΑ, ΑΖ	ve ΑΖ ortak,
to the two, ΕΑ and ΑΖ,	δυσὶ ταῖς ΕΑ, ΑΖ	ΔΑ, ΑΖ ikilisi eşittirler ΕΑ, ΑΖ ikilisinin
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.

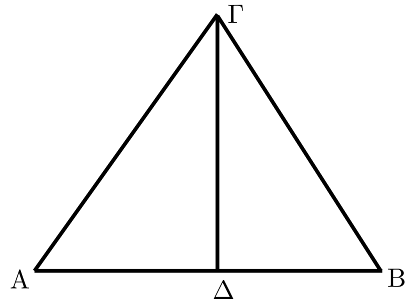
either to either, and the base ΔZ to the base EZ is equal; therefore angle ΔAZ to angle EAZ is equal.	ἑκατέρᾳ ἑκατέρᾳ. καὶ βάσις ἡ ΔΖ βάσει τῇ ΕΖ ἴση ἐστίν· γωνία ἄρα ἡ ὑπὸ ΔΑΖ γωνίᾳ τῇ ὑπὸ ΕΑΖ ἴση ἐστίν.	her biri birine , ve ΔZ tabanı eşittir EZ tabanına; dolayısıyla ΔAZ açısı EAZ eşittir.
Therefore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



3.10

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

—just what it was necessary to do.



3.11

To the given STRAIGHT	Τῇ δοθείσῃ εὐθείᾳ	Verilen bir doğruya
from the given point on it	ἀπὸ τοῦ πρὸς αὐτῇ δοθέντος σημείου	üzerinde verilen bir noktada
at right angles	πρὸς ὀρθὰς γωνίας	dik açılarda
to draw[1] a straight line.[2]	εὐθεῖαν γραμμὴν ἀγαγεῖν.	bir doğru çizmek.

Let be	Ἔστω	Verilmiş olsun
the given STRAIGHT ΑΒ,	ἡ μὲν δοθεῖσα εὐθεῖα ἡ ΑΒ	bir doğru, ΑΒ,
and the given point on it, Γ.	τὸ δὲ δοθὲν σημεῖον ἐπ᾽ αὐτῆς τὸ Γ·	ve üzerinde bir nokta, Γ.

It is necessary then	δεῖ δὴ	Gereklidir
from the point Γ	ἀπὸ τοῦ Γ σημείου	Γ noktasında
to the STRAIGHT ΑΒ	τῇ ΑΒ εὐθείᾳ	ΑΒ doğrusuna
at right angles	πρὸς ὀρθὰς γωνίας	dik açılarda
to draw a straight line.	εὐθεῖαν γραμμὴν ἀγαγεῖν.	bir doğru.

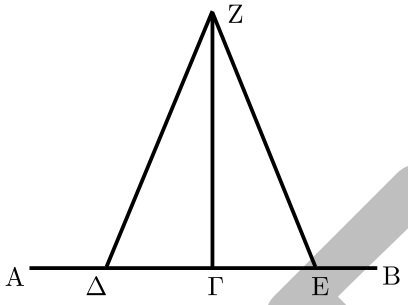
Suppose there has been chosen	Εἰλήφθω	Kabul edelim ki seçilmiş olsun
on ΑΓ at random a point Δ,	ἐπὶ τῆς ΑΓ τυχὸν σημεῖον τὸ Δ,	ΑΓ doğrusunda rastgele bir nokta, Δ,
and there has been laid down	καὶ κείσθω	ve yerleştirilmiş olsub
an equal to ΓΔ, [namely] ΓΕ,	τῇ ΓΔ ἴση ἡ ΓΕ,	ΓΕ eşit olarak ΓΔ doğrusuna,
and there has been constructed	καὶ συνεστάτω	ve inşa edilmiş olsun
on ΔΕ	ἐπὶ τῆς ΔΕ τρίγωνον ἰσόπλευρον	ΔΕ üzeinde bir eşkenar üçgen, ΖΔΕ,
an equilateral triangle, ΖΔΕ,	τὸ ΖΔΕ,	ve ΖΓ birleştirilmiş olsun.
and there has been joined ΖΓ.	καὶ ἐπεζεύχθω ἡ ΖΓ·	

I say that	λέγω, ὅτι	İddia ediyorum ki
to the given straight line ΑΒ	τῇ δοθείσῃ εὐθείᾳ τῇ ΑΒ	verilen ΑΒ doğrusuna
from the given point on it,	ἀπὸ τοῦ πρὸς αὐτῇ δοθέντος σημείου	üzerindeki Γ noktasında
Γ,	τοῦ Γ	dik açılarda
at right angles	πρὸς ὀρθὰς γωνίας	bir ΖΓ doğrusu çizilmişoldu.
has been drawn a straight line, ΖΓ.	εὐθεῖα γραμμὴ ἦκται ἡ ΖΓ.	Çünkü, ΔΓ eşit olduğundan ΓΕ
For, since ΔΓ is equal to ΓΕ,	Ἐπεὶ γὰρ ἴση ἐστὶν ἡ ΔΓ τῇ ΓΕ,	doğrusuna,
and ΓΖ is common,	κοινὴ δὲ ἡ ΓΖ,	ve ΓΖ ortak olduğundan,
the two, ΔΓ and ΓΖ,	δύο δὴ αἱ ΔΓ, ΓΖ	ΔΓ ve ΓΖ ikilisi,
to the two, ΕΓ and ΓΖ,	δυσὶ ταῖς ΕΓ, ΓΖ	eşittirler ΕΓ ve ΓΖ ikilisinin,
are equal,	ἴσαι εἰσὶν	her biri birine;
either to either;	ἑκατέρα ἑκατέρᾳ·	ve ΔΖ tabanı eşittir ΖΕ tabanına;
and the base ΔΖ to the base ΖΕ	καὶ βάσις ἡ ΔΖ βάσει τῇ ΖΕ	dolayısıyla ΔΓΖ açısı eşittir ΕΓΖ
is equal;	ἴση ἐστίν·	açısına;
therefore angle ΔΓΖ	γωνία ἄρα ἡ ὑπὸ ΔΓΖ	ve bitişiktirler.
to angle ΕΓΖ	γωνίᾳ τῇ ὑπὸ ΕΓΖ	Ne zaman bir doğru,
is equal;	ἴση ἐστίν·	bir doğru üzerinde dikilen,
and they are adjacent.	καί εἰσιν ἐφεξῆς.	bitişik açıları birbirine eşit yaparsa,
Whenever a STRAIGHT,	ὅταν δὲ εὐθεῖα	bu açıların her biri dik olur.
standing on a STRAIGHT,	ἐπ᾽ εὐθεῖαν σταθεῖσα	Dolayısıyla ΔΓΖ, ΖΓΕ açılarının her
the adjacent angles	τὰς ἐφεξῆς γωνίας	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’.

equal to one another	ἴσας ἀλλήλαις	
make,	ποιῇ,	
either of the equal angles is right.	ὀρθὴ ἑκατέρα τῶν ἴσων γωνιῶν ἐστιν·	
Right therefore is either of the angles	ὀρθὴ ἄρα ἐστὶν ἑκατέρα τῶν	
ΔΓΖ and ΖΓΕ.	ὑπὸ ΔΓΖ, ΖΓΕ.	
Therefore, to the given STRAIGHT ΑΒ,	Τῇ ἄρα δοθείσῃ εὐθείᾳ τῇ ΑΒ	Dolayısıyla, verilen ΑΒ doğrusuna,
from the given point on it,	ἀπὸ τοῦ πρὸς αὐτῇ δοθέντος σημείου	üzerinde verilmiş Γ noktasında,
Γ,	τοῦ Γ	dik açılarda,
at right angles,	πρὸς ὀρθὰς γωνίας	bir ΓΖ doğrusu çizilmişoldu;
has been drawn the straight line ΓΖ;	εὐθεῖα γραμμὴ ἦκται ἡ ΓΖ·	— yapılması gereken tam buydu.
—just what it was necessary to do.	ὅπερ ἔδει ποιῆσαι.	



3.12

To the given unbounded STRAIGHT,	Ἐπὶ τὴν δοθεῖσαν εὐθεῖαν ἄπειρον	Verilen sınırlanmamış doğruya,
from the given point,	ἀπὸ τοῦ δοθέντος σημείου,	verilen bir noktadan,
which is not on it,	ὃ μή ἐστιν ἐπ᾽ αὐτῆς,	üzerinde olmayan,
to draw a perpendicular straight line.	κάθετον εὐθεῖαν γραμμὴν ἀγαγεῖν.	bir dik doğru çizmek.
Let be	Ἔστω	Verilmiş olsun
the given unbounded STRAIGHT ΑΒ,	ἡ μὲν δοθεῖσα εὐθεῖα ἄπειρος ἡ ΑΒ	bir sınırlanmamış doğru, ΑΒ,
and the given point,	τὸ δὲ δοθὲν σημεῖον,	ve bir nokta,
which is not on it,	ὃ μή ἐστιν ἐπ᾽ αὐτῆς,	üzerinde olmayan, Γ.
Γ.	τὸ Γ·	
It is necessary then	δεῖ δὴ	Gereklidir
to the given unbounded STRAIGHT,	ἐπὶ τὴν δοθεῖσαν εὐθεῖαν ἄπειρον	verilmiş ΑΒ sınırlanmamış doğrusuna
ΑΒ	τὴν ΑΒ	verilmiş Γ noktasından,
from the given point Γ,	ἀπὸ τοῦ δοθέντος σημείου τοῦ Γ,	üzerinde olmayan,
which is not on it,	ὃ μή ἐστιν ἐπ᾽ αὐτῆς,	bir dik doğru çizmek.
to draw a perpendicular straight line.	κάθετον εὐθεῖαν γραμμὴν ἀγαγεῖν.	
For suppose there has been chosen	Εἰλήφθω γὰρ	Çünkü kabul edelim ki seçilmiş olsun
on the other parts	ἐπὶ τὰ ἕτερα μέρη	ΑΒ doğrusunun diğer tarafında
of the STRAIGHT ΑΒ	τῆς ΑΒ εὐθείας	rastgele bir Δ noktası,
at random a point Δ,	τυχὸν σημεῖον τὸ Δ,	ve Γ merkezinde,
and to the center Γ,	καὶ κέντρῳ μὲν τῷ Γ	ΓΔ uzaklığında,
at the distance ΓΔ,	διαστήματι δὲ τῷ ΓΔ	bir çember çizilmiş olsun, ΕΖΗ,
a circle has been drawn, ΕΖΗ,	κύκλος γεγράφθω ὁ ΕΖΗ,	ve ΕΗ doğrusu Θ noktasında ikiye kesilmiş olsun,
and has been cut	καὶ τετμήσθω	
the STRAIGHT ΕΗ	ἡ ΕΗ εὐθεῖα	ve birleştirilmiş olsun
in two at Θ,	δίχα κατὰ τὸ Θ,	ΓΗ, ΓΘ, ve ΓΕ doğruları.
and there have been joined	καὶ ἐπεζεύχθωσαν	
the STRAIGHTs ΓΗ, ΓΘ, and ΓΕ.	αἱ ΓΗ, ΓΘ, ΓΕ εὐθεῖαι·	
I say that	λέγω, ὅτι	İddia ediyorum ki
to the given unbounded STRAIGHT	ἐπὶ τὴν δοθεῖσαν εὐθεῖαν ἄπειρον	verilen sınırlanmamış ΑΒ doğrusuna,
ΑΒ,	τὴν ΑΒ	verilen Γ noktasından,
from the given point Γ,	ἀπὸ τοῦ δοθέντος σημείου τοῦ Γ,	üzerinde olmayan,
which is not on it,	ὃ μή ἐστιν ἐπ᾽ αὐτῆς,	çizilmiş oldu dik ΓΘ doğrusu.

has been drawn a perpendicular, ΓΘ.
For, because ΗΘ is equal to ΘΕ,
and ΘΓ is common,
the two, ΗΘ and ΘΓ,
to the two, ΕΘ and ΘΓ, are equal,
either to either;
and the base ΓΗ to the base ΓΕ
is equal;
therefore angle ΓΘΗ
to angle ΕΘΓ
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.

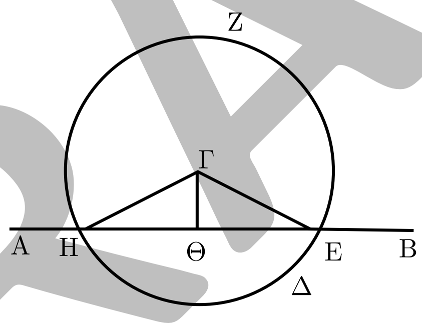
κάθετος ἦκται ἡ ΓΘ.
Ἐπεὶ γὰρ ἴση ἐστὶν ἡ ΗΘ τῇ ΘΕ,
κοινὴ δὲ ἡ ΘΓ,
δύο δὴ αἱ ΗΘ, ΘΓ
δύο ταῖς ΕΘ, ΘΓ ἴσαι εἰσὶν
ἑκατέρα ἑκατέρᾳ·
καὶ βάσις ἡ ΓΗ βάσει τῇ ΓΕ
ἐστιν ἴση·
γωνία ἄρα ἡ ὑπὸ ΓΘΗ
γωνίᾳ τῇ ὑπὸ ΕΘΓ
ἐστιν ἴση.
καί εἰσιν ἐφεξῆς.
ὅταν δὲ εὐθεῖα
ἐπ᾽ εὐθεῖαν σταθεῖσα
τὰς ἐφεξῆς γωνίας
ἴσας ἀλλήλαις ποιῇ,
ὀρθὴ
ἑκατέρα τῶν ἴσων γωνιῶν ἐστιν,
καὶ
ἡ ἐφεστηκυῖα εὐθεῖα
κάθετος καλεῖται
ἐφ᾽ ἣν ἐφέστηκεν.

Çünkü, ΗΘ eşit olduğundan ΘΕ doğrusuna,
ve ΘΓ ortak,
ΗΘ ve ΘΓ ikilisi,
eşittirler ΕΘ ve ΘΓ ikilisinin,
her biri birine;
ve ΓΗ tabanı eşittir ΓΕ tabanına;
dolayısıyla ΓΘΗ açısı eşittir ΕΘΓ 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 ΑΒ,
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 ΑΒ sınırlandırılmamış doğruya,
verilen Γ noktasından,
üzerinde olmayan,
bir dik, ΓΘ, çizilmiş oldu;
— yapılması gereken tam buydu.



3.13

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,
dikiltilirse bir doğrunun üzerine,
yaptığı açılar,
ya iki dik
ya da iki dik açıya eşit
olacak.

For, some STRAIGHT, ΑΒ,
stood on the STRAIGHT ΓΔ,
—suppose it makes[1] angles
ΓΒΑ and ΑΒΔ.

Εὐθεῖα γάρ τις ἡ ΑΒ
ἐπ᾽ εὐθεῖαν τὴν ΓΔ σταθεῖσα
γωνίας ποιείτω
τὰς ὑπὸ ΓΒΑ, ΑΒΔ·

Çünkü, bir ΑΒ doğrusuda,
dikiltilsin ΓΔ doğrusu,
—kabul edelim ki ΓΒΑ ve ΑΒΔ açılarını oluştursun.

I say that
the angles ΓΒΑ and ΑΒΔ
either are two RIGHTs
or [are] equal to two RIGHTs.

λὲγω, ὅτι
αἱ ὑπὸ ΓΒΑ, ΑΒΔ γωνίαι
ἤτοι δύο ὀρθαί εἰσιν
ἢ δυσὶν ὀρθαῖς ἴσαι.

İddia ediyorum ki
ΓΒΑ ve ΑΒΔ açıları
ya iki dik açıdır
ya da iki dik açıya eşittir(ler).

If equal is

Εἰ μὲν οὖν ἴση ἐστὶν

Eğer ΓΒΑ eşitse ΑΒΔ açısına,

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

ΓΒΑ to ΑΒΔ,
they are two rights.

ἡ ὑπὸ ΓΒΑ τῇ ὑπὸ ΑΒΔ,
δύο ὀρθαί εἰσιν.

iki dik açıdırlar.

If not,
suppose there has been drawn,
from the point Β,
to the [straight] ΓΔ,
at right angles,
ΒΕ.

εἰ δὲ οὔ,
ἤχθω
ἀπὸ τοῦ Β σημείου
τῇ ΓΔ [εὐθείᾳ]
πρὸς ὀρθὰς
ἡ ΒΕ·

Eğer değilse,
kabul edelim ki çizilmiş olsun,
Β noktasından,
ΓΔ doğrusuna,
dik açılarda,
ΒΕ.

Therefore ΓΒΕ and ΕΒΔ
are two rights;
and since ΓΒΕ
to the two, ΓΒΑ and ΑΒΕ, is equal
let there be added in common ΕΒΔ.
Therefore ΓΒΕ and ΕΒΔ
to the three, ΓΒΑ, ΑΒΕ, and ΕΒΔ,
are equal.
Moreover,
since ΔΒΑ
to the two, ΔΒΕ and ΕΒΑ, is equal
let there be added in common ΑΒΓ;
therefore ΔΒΑ and ΑΒΓ
to the three, ΔΒΕ, ΕΒΑ, and ΑΒΓ,
are equal.
And ΓΒΕ and ΕΒΔ were shown
equal to the same three.
And equals to the same
are also equal to one another;
also, therefore, ΓΒΕ and ΕΒΔ
to ΔΒΑ and ΑΒΓ are equal;
but ΓΒΕ and ΕΒΔ
are two rights;
and therefore ΔΒΑ and ΑΒΓ
are equal to two rights.

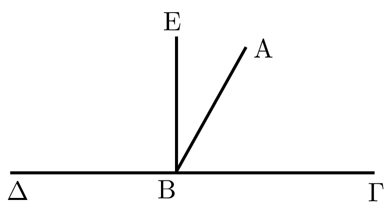
αἱ ἄρα ὑπὸ ΓΒΕ, ΕΒΔ
δύο ὀρθαί εἰσιν·
καὶ ἐπεὶ ἡ ὑπὸ ΓΒΕ
δυσὶ ταῖς ὑπὸ ΓΒΑ, ΑΒΕ ἴση ἐστίν,
κοινὴ προσκείσθω ἡ ὑπὸ ΕΒΔ·
αἱ ἄρα ὑπὸ ΓΒΕ, ΕΒΔ
τρισὶ ταῖς ὑπὸ ΓΒΑ, ΑΒΕ, ΕΒΔ
ἴσαι εἰσίν.
πάλιν,
ἐπεὶ ἡ ὑπὸ ΔΒΑ
δυσὶ ταῖς ὑπὸ ΔΒΕ, ΕΒΑ ἴση ἐστίν,
κοινὴ προσκείσθω ἡ ὑπὸ ΑΒΓ·
αἱ ἄρα ὑπὸ ΔΒΑ, ΑΒΓ
τρισὶ ταῖς ὑπὸ ΔΒΕ, ΕΒΑ, ΑΒΓ
ἴσαι εἰσίν.
ἐδείχθησαν δὲ καὶ αἱ ὑπὸ ΓΒΕ, ΕΒΔ
τρισὶ ταῖς αὐταῖς ἴσαι·
τὰ δὲ τῷ αὐτῷ ἴσα
καὶ ἀλλήλοις ἐστὶν ἴσα·
καὶ αἱ ὑπὸ ΓΒΕ, ΕΒΔ ἄρα
ταῖς ὑπὸ ΔΒΑ, ΑΒΓ ἴσαι εἰσίν·
ἀλλὰ αἱ ὑπὸ ΓΒΕ, ΕΒΔ
δύο ὀρθαί εἰσιν·
καὶ αἱ ὑπὸ ΔΒΑ, ΑΒΓ ἄρα
δυσὶν ὀρθαῖς ἴσαι εἰσίν.

Dolayısıyla ΓΒΕ ve ΕΒΔ iki diktir;
ve olduğundan ΓΒΕ
eşit ΓΒΑ ve ΑΒΕ ikilisine,
ΕΒΔ her birine eklenmiş olsun.
Dolayısıyla ΓΒΕ ve ΕΒΔ
eşittirler,
ΓΒΑ, ΑΒΕ ve ΕΒΔ üçlüsüne.
Dahası,
olduğundan ΔΒΑ
eşit, ΔΒΕ ve ΕΒΑ ikilisine,
ΑΒΓ her birine eklenmiş olsun;
dolayısıyla ΔΒΑ ve ΑΒΓ
eşittirler,
ΔΒΕ, ΕΒΑ ve ΑΒΓ üçlüsüne.
Ve ΓΒΕ ve ΕΒΔ açılarının göster-ilmişti
eşitliği aynı üçlüye.
Ve aynı şeye eşit olanlar birbirine eşit-tir;
ve, dolayısıyla, ΓΒΕ ve ΕΒΔ
eşittirle ΔΒΑ ve ΑΒΓ açılarına;
ama ΓΒΕ veΕΒΔ iki diktir;
ve dolayısıyla ΔΒΑ ve ΑΒΓ
iki dike eşittirler.

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.

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

Eğer, dolayısıyla, bir doğru,
dikiltilirse bir doğrunun üzerine,
yaptığı açılar,
ya iki dik
ya da iki dik açıya eşit
olacak.
— gösterilmesi gereken tam buydu.



3.14

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,

Ἐὰν πρός τινι εὐθείᾳ
καὶ τῷ πρὸς αὐτῇ σημείῳ
δύο εὐθεῖαι
μὴ ἐπὶ τὰ αὐτὰ μέρη κείμεναι
τὰς ἐφεξῆς γωνίας
δυσὶν ὀρθαῖς ἴσας
ποιῶσιν,

Eğer bir doğruya,
ve aynı noktasında,
iki doğru,
aynı tarafında kalmayan,
yaparsa
iki dik açıya eşit
bitişik açılar,

on a STRAIGHT
will be with one another
the STRAIGHTs.

ἐπ᾽ εὐθείας
ἔσονται ἀλλήλαις
αἱ εὐθεῖαι.

bir doğruda
kalacaklar ikisi birlikte,
doğruların.

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.

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·

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.

I say that
on a STRAIGHT
with ΓΒ is ΒΔ.

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

İddia ediyorum ki
ΒΔ ile ΓΒ bir doğrudadır.

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

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

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

For, since the STRAIGHT AB
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.

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.

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.

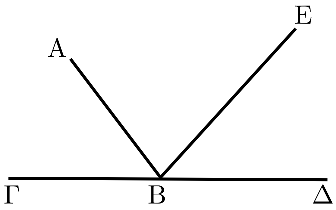
If, therefore, to some STRAIGHT,
and at the same point,
two STRAIGHTs,
not lying in the same parts,
adjacent angles
two right angles
make,
on a STRAIGHT
will be with one another
the STRAIGHTs;
—just what it was necessary to show.

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.

Eğer, dolayısıyla, bir doğruya,
ve aynı noktasında,
iki doğru,
aynı tarafında kalmayan,
yaparsa
iki dik açıya eşit
bitişik açılar,
bir doğruda
kalacaklar ikisi birlikte,
doğruların.
— gösterilmesi gereken tam buydu.

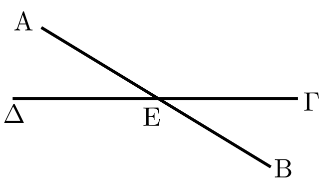
[1]The English perfect sounds strange here, but the point may be that the standing has already come to be and will continue.

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



3.15

If two straights cut one another,	Ἐὰν δύο εὐθεῖαι τέμνωσιν ἀλλήλας,	Eğer iki doğru keserse birbirini,
the vertical[1] angles	τὰς κατὰ κορυφὴν γωνίας	dikey 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 bir birlerini
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	dikiltilmişti ΓΔ doğrusuna,
making angles ΓΕΑ and ΑΕΔ,	γωνίας ποιοῦσα τὰς ὑπὸ ΓΕΑ, ΑΕΔ,	oluşturarak 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-ilmişti
equal to two rights;	δυσὶν ὀρθαῖς ἴσαι·	eşitliği iki dik açıya,
therefore ΓΕΑ and ΑΕΔ	αἱ ἄρα ὑπὸ ΓΕΑ, ΑΕΔ	dolayısıyla ΓΕΑ ve ΑΕΔ
are equal to ΑΕΔ and ΔΕΒ.	ταῖς ὑπὸ ΑΕΔ, ΔΕΒ ἴσαι εἰσίν.	eşittirler ΑΕΔ ve ΔΕΒ açılarına.
In common	κοινὴ	Ortak ΑΕΔ açısının çıkartılmış
suppose there has been taken away	ἀφῃρήσθω	olduğu kabul edilsin;
ΑΕΔ;	ἡ ὑπὸ ΑΕΔ·	
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	dikey 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.



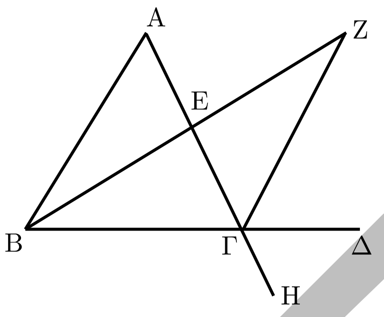
[1] The Greek is κατὰ κορυφὴν, which might be translated as 'at a head', just as, in the conclusion of I.10, ΑΒ has been cut in two 'at Δ', κατὰ τὸ Δ. But κορυφή and the Latin *vertex* can both mean *crown of the head,* and in anatomical use, the English *vertical* refers to this crown. Apollonius uses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

3.16

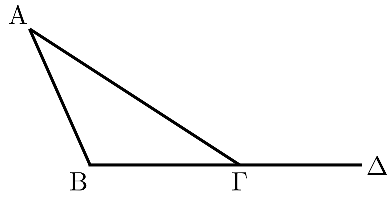
One of the sides of any triangle being extended, the exterior angle than either of the interior and opposite angles is greater.	Παντὸς τριγώνου μιᾶς τῶν πλευρῶν προσεκβληθείσης ἡ ἐκτὸς γωνία ἑκατέρας τῶν ἐντὸς καὶ ἀπεναντίον γωνιῶν μείζων ἐστίν.	Herhangi bir üçgenin kenarlarından biri uzatılıdığında, dış açı 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·	Verilmiş 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 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 ΕΓΔ 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,	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,	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 ΕΓΔ, ΕΓΖ açısından; dolayısıyla büyüktür ΑΓΔ, ΒΑΕ açısından. Benzer şekilde ikiye kesilmiş olduğundan ΒΓ , gösterilecek ki ΒΓΗ, ΑΓΔ açısına eşit olan, büyüktür ΑΒΓ açısından.

[is] greater than ΑΒΓ.	μείζων καὶ τῆς ὑπὸ ΑΒΓ.	
Therefore, of any triangle,	Παντὸς ἄρα τριγώνου	Dolayısıyla, herhangi bir üçgenin,
one of the sides	μιᾶς τῶν πλευρῶν	kenarlarından biri
being extended,	προσεκβληθείσης	uzatıldığında,
the exterior angle	ἡ ἐκτὸς γωνία	dış açı
than either	εκατέρας	her bir
of the interior and opposite angles	τῶν ἐντὸς καὶ ἀπεναντίον γωνιῶν	iç ve karşıt açıdan
is greater;	μείζων ἐστίν·	büyüktür;
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	— gösterilmesi gereken tam buydu.



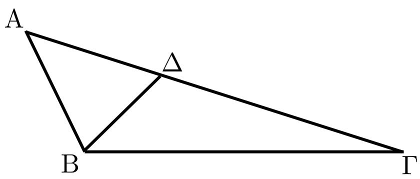
3.17

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



3.18

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.

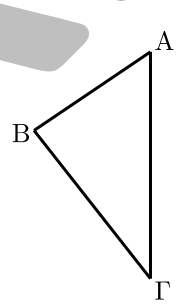


3.19

Of any triangle,	Παντὸς τριγώνου	Herhangi bir üçgende,

[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.

under the greater angle	ὑπὸ τὴν μείζονα	daha büyük bir açı,
the greater side subtends.[1]	γωνίαν ἡ μείζων πλευρὰ ὑποτείνει.	daha büyük bir kenarca karşılanır.
For, let there be	Ἔστω	Çünkü, verilmiş olsun
a triangle, ΑΒΓ,	τρίγωνον τὸ ΑΒΓ	bir ΑΒΓ üçgeni,
having angle ΑΒΓ greater	μείζονα ἔχον τὴν ὑπὸ ΑΒΓ γωνίαν	ΑΒΓ açısı daha büyük olan,
than ΒΓΑ.	τῆς ὑπὸ ΒΓΑ·	ΒΓΑ açısından.
I say that	λέγω, ὅτι	İddia ediyorum ki
also side ΑΓ	καὶ πλευρὰ ἡ ΑΓ	ΑΓ kenarı da
is greater than side ΑΒ.	πλευρᾶς τῆς ΑΒ μείζων ἐστίν.	daha büyüktür ΑΒ kenarından.
For if not,	Εἰ γὰρ μή,	Çünkü değil ise,
either ΑΓ is equal to ΑΒ	ἤτοι ἴση ἐστὶν ἡ ΑΓ τῇ ΑΒ	ya ΑΓ eşittir ΑΒ kenarına
or less;	ἢ ἐλάσσων·	ya da daha küçüktür;
[but] ΑΓ is not equal to ΑΒ;	ἴση μὲν οὖν οὐκ ἔστιν ἡ ΑΓ τῇ ΑΒ·	(ama) ΑΓ eşit değildir ΑΒ kenarına;
for [if it were],	ἴση γὰρ ἂν	çünkü (eğer olsaydı),
also ΑΒΓ would be[2] equal to ΑΓΒ;	ἦν καὶ γωνία ἡ ὑπὸ ΑΒΓ τῇ ὑπὸ ΑΓΒ·	ΑΒΓ da eşit olurdu ΑΓΒ açısına;
but it is not;	οὐκ ἔστι δέ·	ama değildir;
therefore ΑΓ is not equal to ΑΒ.	οὐκ ἄρα ἴση ἐστὶν ἡ ΑΓ τῇ ΑΒ.	dolayısıyla ΑΓ eşit değildir ΑΒ kenarına.
Nor is ΑΓ less than ΑΒ;	οὐδὲ μὴν ἐλάσσων ἐστὶν ἡ ΑΓ τῆς ΑΒ·	ΑΓ küçük de değildir ΑΒ kenarından;
for [if it were],	ἐλάσσων γὰρ	çünkü (eğer olsaydı),
also angle ΑΒΓ would be [less]	ἂν ἦν καὶ γωνία ἡ ὑπὸ ΑΒΓ	ΑΒΓ açısı da olurdu (küçük)
than ΑΓΒ;	τῆς ὑπὸ ΑΓΒ·	ΑΓΒ açısından;
but it is not;	οὐκ ἔστι δέ·	ama değildir;
therefore ΑΓ is not less than ΑΒ.	οὐκ ἄρα ἐλάσσων ἐστὶν ἡ ΑΓ τῆς ΑΒ.	dolayısıyla ΑΓ küçük değildir ΑΒ kenarından.
And it was shown that	ἐδείχθη δέ, ὅτι	Ve gösterilmişti ki
it is not equal.	οὐδὲ ἴση ἐστίν.	eşit değildir.
Therefore ΑΓ is greater than ΑΒ.	μείζων ἄρα ἐστὶν ἡ ΑΓ τῆς ΑΒ.	Dolayısıyla ΑΓ daha büyüktür ΑΒ kenarından.
Therefore, of any triangle,	Παντὸς ἄρα τριγώνου	Dolayısıyla, herhangi bir üçgende,
under the greater angle	ὑπὸ τὴν μείζονα γωνίαν	daha büyük bir açı,
the greater side subtends;	ἡ μείζων πλευρὰ ὑποτείνει·	daha büyük bir kenarca karşılanır;
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	— gösterilmesi gereken tam buydu.



3.20

Two sides of any triangle	Παντὸς τριγώνου αἱ δύο πλευραὶ	Herhangi bir üçgenin iki kenarı
are greater than the remaining one	τῆς λοιπῆς μείζονές εἰσι	daha büyüktür geriye kalandan
—taken anyhow.	πάντῃ μεταλαμβανόμεναι.	—nasıl seçilirse seçilsin.
For, let there be	Ἔστω γὰρ	Çünkü verilmiş olsun
a triangle, ΑΒΓ.	τρίγωνον τὸ ΑΒΓ·	bir ΑΒΓ üçgeni.
I say that	λέγω, ὅτι	İddia ediyorum ki
two sides of triangle ΑΒΓ	τοῦ ΑΒΓ τριγώνου αἱ δύο πλευραὶ	ΑΒΓ üçgeninin iki kenarı

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

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

are greater than the remaining one,
—taken anyhow,
ΒΑ and ΑΓ, than ΒΓ,
ΑΒ and ΒΓ, than ΑΓ,
ΒΓ and ΓΑ, than ΑΒ.

τῆς λοιπῆς μείζονές εἰσι
πάντῃ μεταλαμβανόμεναι,
αἱ μὲν ΒΑ, ΑΓ τῆς ΒΓ,
αἱ δὲ ΑΒ, ΒΓ τῆς ΑΓ,
αἱ δὲ ΒΓ, ΓΑ τῆς ΑΒ.

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

Διήχθω γὰρ
ἡ ΒΑ ἐπὶ τὸ Δ σημεῖον,
καὶ κείσθω
τῇ ΓΑ ἴση ἡ ΑΔ,
καὶ ἐπεζεύχθω
ἡ ΔΓ.

Çünkü, çizilmiş olsun
ΒΑ kenarı geçerek bir Δ noktasından,
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.

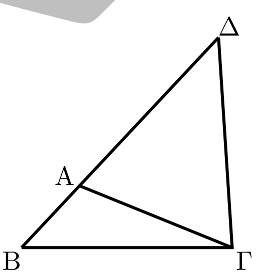
Ἐπεὶ οὖν ἴση ἐστὶν ἡ ΔΑ τῇ ΑΓ,
ἴση ἐστὶ καὶ
γωνία ἡ ὑπὸ ΑΔΓ τῇ ὑπὸ ΑΓΔ·
μείζων ἄρα ἡ ὑπὸ ΒΓΔ τῆς ὑπὸ ΑΔΓ·
καὶ ἐπεὶ τρίγωνόν ἐστι τὸ ΔΓΒ
μείζονα ἔχον τὴν ὑπὸ ΒΓΔ γωνίαν
τῆς ὑπὸ ΒΔΓ,
ὑπὸ δὲ τὴν μείζονα γωνίαν
ἡ μείζων πλευρὰ ὑποτείνει,
ἡ ΔΒ ἄρα τῆς ΒΓ ἐστι μείζων.
ἴση δὲ ἡ ΔΑ τῇ ΑΓ·
μείζονες ἄρα αἱ ΒΑ, 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,
ΓΒΔ daha büyük olan
ΔΒΓ 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.



3.21

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,

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.

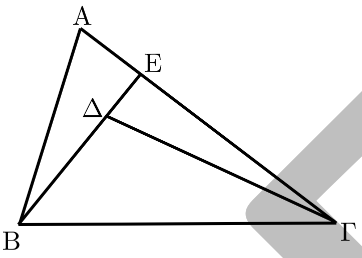
Eğer bir üçgende,
kenarlardan birinin
uçlarından,
iki doğru
içeride inşa edilirse,
inşa edilen doğrular,
üçgenin geriye kalan iki kenarından
daha küçük olacak,
ama daha büyük bir açıyı içerecekler.

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

but will contain the a greater angle.		
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.
I say that ΒΔ and ΔΓ than the remaining two sides of the triangle, ΒΑ and ΑΓ, are less, but contain a greater angle, ΒΔΓ, than ΒΑΓ.	λέγω, ὅτι αἱ ΒΔ, ΔΓ τῶν λοιπῶν τοῦ τριγώνου δύο πλευρῶν τῶν ΒΑ, ΑΓ ἐλάσσονες μέν εἰσιν, μείζονα δὲ γωνίαν περιέχουσι τὴν ὑπὸ ΒΔΓ τῆς ὑπὸ ΒΑΓ.	İddia ediyorum ki ΒΔ ve ΔΓ üçgenin geriye kalan iki ΒΑ ve ΑΓ kenarından, daha küçütürler, ama içerirler, ΒΑΓ açısından daha büyük ΒΔΓ açısını.
For, let ΒΔ be drawn through to Ε.	Διήχθω γὰρ ἡ ΒΔ ἐπὶ τὸ Ε.	Çünkü, ΒΔ çizilmiş olsun Ε noktasına doğru.
And since, of any triangle, two sides than the remaining one are greater, of the triangle ΑΒΕ, the two sides ΑΒ and ΑΕ are greater than ΒΕ; suppose has been added in common ΕΓ; therefore ΒΑ and ΑΓ than ΒΕ and ΕΓ are greater. Moreover, since, of the triangle ΓΕΔ, the two sides ΓΕ and ΕΔ are greater than ΓΔ, suppose has been added in common ΔΒ; therefore ΓΕ and ΕΒ than ΓΔ and ΔΒ are greater. But than ΒΕ and ΕΓ ΒΑ and ΑΓ were shown greater; therefore by much ΒΑ and ΑΓ than ΒΔ and ΔΓ are greater.	καὶ ἐπεὶ παντὸς τριγώνου αἱ δύο πλευραὶ τῆς λοιπῆς μείζονές εἰσιν, τοῦ ΑΒΕ ἄρα τριγώνου αἱ δύο πλευραὶ αἱ ΑΒ, ΑΕ τῆς ΒΕ μείζονές εἰσιν· κοινὴ προσκείσθω ἡ ΕΓ· αἱ ἄρα ΒΑ, ΑΓ τῶν ΒΕ, ΕΓ μείζονές εἰσιν. πάλιν, ἐπεὶ τοῦ ΓΕΔ τριγώνου αἱ δύο πλευραὶ αἱ ΓΕ, ΕΔ τῆς ΓΔ μείζονές εἰσιν, κοινὴ προσκείσθω ἡ ΔΒ· αἱ ΓΕ, ΕΒ ἄρα τῶν ΓΔ, ΔΒ μείζονές εἰσιν. ἀλλὰ τῶν ΒΕ, ΕΓ μείζονες ἐδείχθησαν αἱ ΒΑ, ΑΓ· πολλῷ ἄρα αἱ ΒΑ, ΑΓ τῶν ΒΔ, ΔΓ μείζονές εἰσιν.	Ve herhangi bir üçgenin iki kenarı, geriye kalandan büyük olduğundan, ΑΒΕ üçgeninin, iki kenarı, ΑΒ ve ΑΕ büyüktür ΒΕ kenarından; ortak olarak eklenmiş olsun ΕΓ; dolayısıyla ΒΑ ve ΑΓ, ΒΕ ve ΕΓ kenarlarından büyüktürler. Dahası, ΓΕΔ üçgeninin, iki kenarları, ΓΕ ve ΕΔ büyüktür ΓΔ kenarından, ortak olarak eklenmiş olsun ΔΒ; dolayısıyla ΓΕ ve ΕΒ, ΓΔ ve ΔΒ kenarlarından büyüktürler. Ama ΒΕ ve ΕΓ kenarlarından ΒΑ ve ΑΓ kenarlarının gösterilmişti büyüklüğü; dolayısıyla çok daha büyüktür ΒΑ ve ΑΓ, ΒΔ ve ΔΓ kenarlarından.
Again, since of any triangle the external angle than the interior and opposite angle is greater, therefore, of the triangle ΓΔΕ the exterior angle ΒΔΓ is greater than ΓΕΔ. For the same [reason] again, of the triangle ΑΒΕ, the exterior angle ΓΕΒ is greater than ΒΑΓ. But than ΓΕΒ	Πάλιν, ἐπεὶ παντὸς τριγώνου ἡ ἐκτὸς γωνία τῆς ἐντὸς καὶ ἀπεναντίον μείζων ἐστίν, τοῦ ΓΔΕ ἄρα τριγώνου ἡ ἐκτὸς γωνία ἡ ὑπὸ ΒΔΓ μείζων ἐστὶ τῆς ὑπὸ ΓΕΔ. διὰ ταὐτὰ τοίνυν καὶ τοῦ ΑΒΕ τριγώνου ἡ ἐκτὸς γωνία ἡ ὑπὸ ΓΕΒ μείζων ἐστὶ τῆς ὑπὸ ΒΑΓ. ἀλλὰ τῆς ὑπὸ ΓΕΒ	Tekrar, herhangi bir üçgenin dış açısı iç ve karşıt açısından daha büyüktür, dolayısıyla, ΓΔΕ üçgeninin dış açısı ΒΔΓ büyüktür ΓΕΔ açısından. Aynı [sebepten] tekrar, ΑΒΕ üçgeninin, dış açısı ΓΕΒ büyüktür ΒΑΓ açısından. Ama ΓΕΒ açısından,

[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.

ΒΔΓ was shown greater;	μείζων ἐδείχθη ἡ ὑπὸ ΒΔΓ·	ΒΔΓ açısının büyüklüğü gösterilmişti;
therefore by much	πολλῷ ἄρα	dolayısıyla çok daha
ΒΔΓ is greater than ΒΑΓ.	ἡ ὑπὸ ΒΔΓ μείζων ἐστὶ τῆς ὑπὸ ΒΑΓ.	büyüktür ΒΔΓ, ΒΑΓ açısından.
If, therefore, of a triangle,	Ἐὰν ἄρα τριγώνου	Eğer, dolayısıyla, bir üçgenin,
on one of the sides,	ἐπὶ μιᾶς τῶν πλευρῶν	kenarlardan birinin
from its extremities,	ἀπὸ τῶν περάτων	uçlarından,
two STRAIGHTS	δύο εὐθεῖαι	iki doğru
be constructed within,	ἐντὸς συσταθῶσιν,	içeride inşa edilirse,
the constructed [STRAIGHTS],	αἱ συσταθεῖσαι	inşa edilen doğrular,
than the remaining two sides of the triangle	τῶν λοιπῶν τοῦ τριγώνου δύο πλευρῶν	üçgenin geriye kalan iki kenarından
	ἐλάττονες μέν εἰσιν,	daha küçük olacak,
will be less,	μείζονα δὲ γωνίαν περιέχουσιν·	ama daha büyük bir açıyı içerecekler;
but will contain the a greater angle;	ὅπερ ἔδει δεῖξαι.	— gösterilmesi gereken tam buydu.
—just what it was necessary to show.		



3.22

From three STRAIGHTS,	Ἐκ τριῶν εὐθειῶν,	Üç doğrudan,
which are equal	αἵ εἰσιν ἴσαι	eşit olan
to three given [STRAIGHTS],	τρισὶ ταῖς δοθείσαις [εὐθείαις],	verilmiş üç doğruya,
a triangle to be constructed;	τρίγωνον συστήσασθαι·	bir üçgen oluşturulması;
and it is necessary	δεῖ δὲ[2]	ve gereklidir
for two than the remaining one	τὰς δύο τῆς λοιπῆς	ikisinin, kalandan
to be greater	μείζονας εἶναι	daha büyük olması
[because of any triangle,	πάντῃ μεταλαμβανομένας	(çünkü herhangi bir üçgenin,
two sides	[διὰ τὸ καὶ παντὸς τριγώνου	iki kenarı
are[1] greater than the remaining one	τὰς δύο πλευρὰς	büyüktür geriye kalandan
taken anyhow].	τῆς λοιπῆς μείζονας εἶναι	nasıl seçilirse seçilsin).
	πάντῃ μεταλαμβανομένας].	
Let be	Ἔστωσαν	Verilmiş olsun
the given three STRAIGHTS	αἱ δοθεῖσαι τρεῖς εὐθεῖαι	üç doğru
Α, Β, and Γ,	αἱ Α, Β, Γ,	Α, Β, ve Γ,
of which two than the remaining one	ὧν αἱ δύο τῆς λοιπῆς	ikisi, kalandan
are greater,	μείζονες ἔστωσαν	büyük olan,
taken anyhow,	πάντῃ μεταλαμβανόμεναι,	nasıl seçilirse seçilsin,
Α and Β than Γ,	αἱ μὲν Α, Β τῆς Γ,	Α ile Β, Γ kenarından,
Α and Γ than Β,	αἱ δὲ Α, Γ τῆς Β,	Α ile Γ, Β kenarından,
and Β and Γ than Α.	καὶ ἔτι αἱ Β, Γ τῆς Α·	ve Β ile Γ, Α kenarından.
Is is necessary	δεῖ δὴ	Gereklidir
from equals to Α, Β, and Γ	ἐκ τῶν ἴσων ταῖς Α, Β, Γ	Α, Β ve Γ doğrularına eşit olanlardan
for a triangle to be constructed.	τρίγωνον συστήσασθαι.	bir üçgenin inşa edilmesi.
Suppose there is laid out	Ἐκκείσθω	Yerleştirilmiş olsun
some straight line, ΔΕ,	τις εὐθεῖα ἡ ΔΕ	bir ΔΕ doğrusu,
bounded at Δ,	πεπερασμένη μὲν κατὰ τὸ Δ	Δ noktasında sınırlanmış,
but unbounded at Ε,	ἄπειρος δὲ κατὰ τὸ Ε,	ama Ε noktasında sınırlandırılmamış,

[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 §1.3); but Proclus and Eutocius have δεῖ δέ in their commentaries.

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,
and KZ and KH have been joined.

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,
καὶ ἐπεζεύχθωσαν αἱ ΚΖ, ΚΗ·

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,
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.

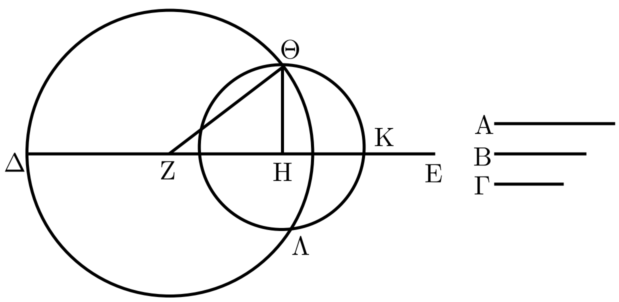
Ἐπεὶ γὰρ τὸ Ζ σημεῖον
κέντρον ἐστὶ τοῦ ΔΚΛ κύκλου,
ἴση ἐστὶν ἡ ΖΔ τῇ ΖΚ·
ἀλλὰ ἡ ΖΔ τῇ Α ἐστιν ἴση.
καὶ ἡ ΚΖ ἄρα τῇ Α ἐστιν ἴση.
πάλιν,
ἐπεὶ τὸ Η σημεῖον
κέντρον ἐστὶ τοῦ ΛΚΘ κύκλου,
ἴση ἐστὶν ἡ ΗΘ τῇ ΗΚ·
ἀλλὰ ἡ ΗΘ τῇ Γ ἐστιν ἴση·
καὶ ἡ ΚΗ ἄρα τῇ Γ ἐστιν ἴση.
ἐστὶ δὲ καὶ ἡ ΖΗ τῇ Β ἴση·
αἱ τρεῖς ἄρα εὐθεῖαι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



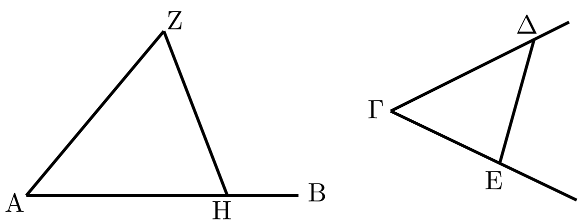
3.23

At the given STRAIGHT,

Πρὸς τῇ δοθείσῃ εὐθείᾳ

Verilmiş bir doğruda,

and at the given point on it,	καὶ τῷ πρὸς αὐτῇ σημείῳ	ve üzerinde verilmiş noktada,
equal to the given rectilineal angle,	τῇ δοθείσῃ γωνίᾳ εὐθυγράμμῳ ἴσην	verilmiş düzkenar açıya eşit olan,
a rectilineal angle to be constructed.	γωνίαν εὐθύγραμμον συστήσασθαι.	bir düzkenar açı inşa edilmesi.
Let be	Ἔστω	Verilmiş olsun
the given STRAIGHT AB,	ἡ μὲν δοθεῖσα εὐθεῖα ἡ ΑΒ,	AB doğrusu,
the point on it, A,	τὸ δὲ πρὸς αὐτῇ σημεῖον τὸ Α,	üzerindeki A noktası,
the given rectilineal angle,	ἡ δὲ δοθεῖσα γωνία εὐθύγραμμος	verilmiş olsun düzkenar açı,
ΔΓΕ.	ἡ ὑπὸ ΔΓΕ·	ΔΓΕ.
It is necessary then,	δεῖ δὴ	Gereklidir simdi,
on the given STRAIGHT, AB,	πρὸς τῇ δοθείσῃ εὐθείᾳ τῇ ΑΒ	verilmiş AB doğrusunda,
and at the point A on it,	καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ Α	ve üzerindeki A noktasında,
to the given rectilileal angle	τῇ δοθείσῃ γωνίᾳ εὐθυγράμμῳ	verilmiş düzkenar
ΔΓΕ	τῇ ὑπὸ ΔΓΕ	ΔΓΕ açısına
equal,	ἴσην	eşit,
for a rectilineal angle	γωνίαν εὐθύγραμμον	bir düzkenar açının
to be constructed.	συστήσασθαι.	inşa edilmesi.
Suppose there have been chosen	Εἰλήφθω	Seçilmiş olsun
on either of ΓΔ and ΓΕ	ἐφ᾽ ἑκατέρας τῶν ΓΔ, ΓΕ	ΓΔ ve ΓΕ doğrularının her birinden
random points Δ and Ε,	τυχόντα σημεῖα τὰ Δ, Ε,	rastgele Δ ve Ε noktaları,
and ΔΕ has been joined,	καὶ ἐπεζεύχθω ἡ ΔΕ·	ve ΔΕ birleştirilmiş olsun,
and from three STRAIGHTs,	καὶ ἐκ τριῶν εὐθειῶν,	ve üç doğrudan,
which are equal to the three,	αἵ εἰσιν ἴσαι τρισὶ	eşit olan verilmiş üç,
ΓΔ, ΔΕ, and ΓΕ,	ταῖς ΓΔ, ΔΕ, ΓΕ,	ΓΔ, ΔΕ ve ΓΕ doğrularına,
triangle ΑΖΗ has been constructed,	τρίγωνον συνεστάτω τὸ ΑΖΗ,	bir ΑΖΗ üçgen inşa edilmiş olsun,
so that equal are	ὥστε ἴσην εἶναι	öyle ki, eşit olsun
ΓΔ to ΑΖ,	τὴν μὲν ΓΔ τῇ ΑΖ,	ΓΔ, ΑΖ doğrusuna,
ΓΕ to ΑΗ,	τὴν δὲ ΓΕ τῇ ΑΗ,	ΓΕ, ΑΗ doğrusuna, ve ΔΕ, ΖΗ doğrusuna.
and ΔΕ to ΖΗ.	καὶ ἔτι τὴν ΔΕ τῇ ΖΗ.	
Since then the two, ΔΓ and ΓΕ,	Ἐπεὶ οὖν δύο αἱ ΔΓ, ΓΕ	O zaman ΔΓ ve ΓΕ ikilisi,
are equal to the two, ΖΑ and ΑΗ,	δύο ταῖς ΖΑ, ΑΗ ἴσαι εἰσὶν	eşit olduğundan ΖΑ ve ΑΗ ikilisinin,
either to either,	ἑκατέρα ἑκατέρᾳ,	her biri birine,
and the base ΔΕ to the base ΖΗ	καὶ βάσις ἡ ΔΕ βάσει τῇ ΖΗ	ve ΔΕ tabanı, ΖΗ tabanına
is equal,	ἴση,	eşit,
therefore the angle ΔΓΕ	γωνία ἄρα ἡ ὑπὸ ΔΓΕ γωνίᾳ	dolayısıyla ΔΓΕ açısı
is equal to ΖΑΗ.	τῇ ὑπὸ ΖΑΗ ἐστιν ἴση.	eşittir ΖΑΗ açısına.
Therefore, on the given STRAIGHT,	Πρὸς ἄρα τῇ δοθείσῃ εὐθείᾳ	Dolayısıyla,
AB,	τῇ ΑΒ	AB doğrusunda,
and at the point A on it,	καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ Α τῇ	ve üzerindeki A noktasında,
equal to the given rectilineal angle, ΔΓΕ,	δοθείσῃ γωνίᾳ εὐθυγράμμῳ τῇ ὑπὸ ΔΓΕ ἴσῃ	verilen düzkenar ΔΓΕ açısına eşit, ΔΓΕ düzkenar açısı inşa edilmiştir;
the rectilineal angle ΔΓΕ has been constructed;	γωνία εὐθύγραμμος συνέσταται ἡ ὑπὸ ΖΑΗ·	— yapılması gereken tam buydu.
—just what it was necessary to do.	ὅπερ ἔδει ποιῆσαι.	



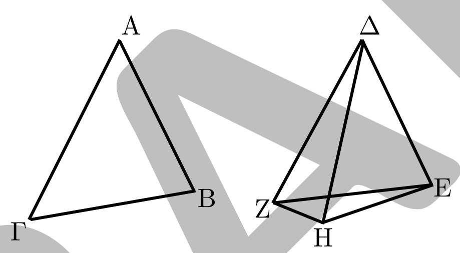
3.24

If two triangles	Ἐὰν δύο τρίγωνα	Eğer iki üçgenin
two sides	τὰς δύο πλευρὰς	(birinin) iki kenarı
to two sides	[ταῖς] δύο 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.
Let there be	Ἔστω	Verilmiş olsun
two triangles, ΑΒΓ and ΔΕΖ,	δύο τρίγωνα τὰ ΑΒΓ, ΔΕΖ	iki ΑΒΓ ve ΔΕΖ üçgeni,
—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 angle at Α,	ἡ δὲ πρὸς τῷ Α γωνία	—ve Α noktasındaki açısı,
than the angle at Δ,	τῆς πρὸς τῷ Δ γωνίας	Δ doktasındakinden,
let it be greater.	μείζων ἔστω·	büyük olsun.
I say that	λέγω, ὅτι	İddia ediyorum ki
also the base ΒΓ	καὶ βάσις ἡ ΒΓ	ΒΓ tabanı da
than the base ΕΖ	βάσεως τῆς ΕΖ	ΕΖ tabanından
is greater.	μείζων ἐστίν.	büyüktür.
For since [it] is greater,	Ἐπεὶ γὰρ μείζων	Çünkü büyük olduğundan,
[namely] angle ΒΑΓ	ἡ ὑπὸ ΒΑΓ γωνία	ΒΑΓ açısı
than angle ΕΔΖ,	τῆς ὑπὸ ΕΔΖ γωνίας,	ΕΔΖ açısından,
suppose has been constructed	συνεστάτω	inşa edilmiş olsun
on the STRAIGHT, ΔΕ,	πρὸς τῇ ΔΕ εὐθείᾳ	ΔΕ doğrusunda,
and at the point Δ on it,	καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ Δ	ve üzerindeki Δ noktasında,
equal to angle ΒΑΓ,	τῇ ὑπὸ ΒΑΓ γωνίᾳ ἴση	ΒΑΓ açısına eşit,
ΕΔΗ,	ἡ ὑπὸ ΕΔΗ,	ΕΔΗ,
and suppose is laid down,	καὶ κείσθω	ve yerleştirilmiş olsun
to either of ΑΓ and ΔΖ equal,	ὁποτέρᾳ τῶν ΑΓ, ΔΖ ἴση	ΑΓ ve ΔΖ kenarlarının ikisine de eşit,
ΔΗ,	ἡ ΔΗ,	ΔΗ,
and suppose have been joined	καὶ ἐπεζεύχθωσαν	ve birleştirilmiş olsun
ΕΗ and ΖΗ.	αἱ ΕΗ, ΖΗ.	ΕΗ ve ΖΗ.
Since [it] is equal,	Ἐπεὶ οὖν ἴση ἐστὶν	Eşit olduğundan,
ΑΒ to ΔΕ,	ἡ μὲν ΑΒ τῇ ΔΕ,	ΑΒ, ΔΕ kenarına,
and ΑΓ to ΔΗ,	ἡ δὲ ΑΓ τῇ ΔΗ,	ve ΑΓ, ΔΗ kenarına,
the two, ΒΑ and ΑΓ,	δύο δὴ αἱ ΒΑ, ΑΓ	ΒΑ ve ΑΓ ikilisi,
to the two, ΕΔ and ΔΗ,	δυσὶ ταῖς ΕΔ, ΔΗ	ΕΔ ve ΔΗ iklisine,
are equal,	ἴσαι εἰσὶν	eşittirler,
either to either;	ἑκατέρα ἑκατέρᾳ·	her biri birine;
and angle ΒΑΓ	καὶ γωνία ἡ ὑπὸ ΒΑΓ	ve ΒΑΓ açısı
to angle ΕΔΗ is equal;	γωνίᾳ τῇ ὑπὸ ΕΔΗ ἴση·	ΕΔΗ açısına eşittir;
therefore the base ΒΓ	βάσις ἄρα ἡ ΒΓ	dolayısıyla ΒΓ tabanı
to the base ΕΗ is equal.	βάσει τῇ ΕΗ ἐστιν ἴση.	ΕΗ tabanına eşittir.
Moreover,	πάλιν,	Dahası,
since [it] is equal,	ἐπεὶ ἴση ἐστὶν	eşit olduğundan,
[namely] ΔΖ to ΔΗ,	ἡ ΔΖ τῇ ΔΗ,	ΔΖ, ΔΗ kenarına,
[it] too is equal,	ἴση ἐστὶ καὶ	yine eşittir,
[namely] angle ΔΗΖ to ΔΖΗ;	ἡ ὑπὸ ΔΗΖ γωνία τῇ ὑπὸ ΔΖΗ·	ΔΗΖ açısı, ΔΖΗ açısına;
therefore [it] is greater,	μείζων ἄρα	dolayısıyla büyüktür
[namely] ΔΖΗ than ΕΗΖ;	ἡ ὑπὸ ΔΖΗ τῆς ὑπὸ ΕΗΖ·	ΔΖΗ, ΕΗΖ açısından;
therefore [it] is much greater,	πολλῷ ἄρα μείζων ἐστὶν	dolayısıyla çok daha büyüktür
[namely] ΕΖΗ than ΕΗΖ.	ἡ ὑπὸ ΕΖΗ τῆς ὑπὸ ΕΗΖ.	ΕΖΗ, ΕΗΖ açısından.
And since there is a triangle, ΕΖΗ,	καὶ ἐπεὶ τρίγωνόν ἐστι τὸ ΕΖΗ	Ve ΕΖΗ bir üçgen olduğundan,

having greater	μείζονα ἔχον	büyük olan
angle EZH than EHZ,	τὴν ὑπὸ EZH γωνίαν τῆς ὑπὸ EHZ,	EZH açısı EHZ açısından,
and the greater angle,	ὑπὸ δὲ τὴν μείζονα γωνίαν	ve daha büyük açı,
—the greater side subtends it;	ἡ μείζων πλευρὰ ὑποτείνει,	—daha büyük açı tarafından karşılandığından;
greater therefore also is	μείζων ἄρα καὶ	büyüktür dolayısıyla
side EH than EZ.	πλευρὰ ἡ EH τῆς EZ.	EH kenarı da EZ kenarından.
And [it] is equal, EH to BΓ;	ἴση δὲ ἡ EH τῇ BΓ·	Ve eşittir, EH , BΓ kenarına;
greater therefore is BΓ than EZ.	μείζων ἄρα καὶ ἡ BΓ τῆς EZ.	büyüktür dolayısıyla BΓ, EZ 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.

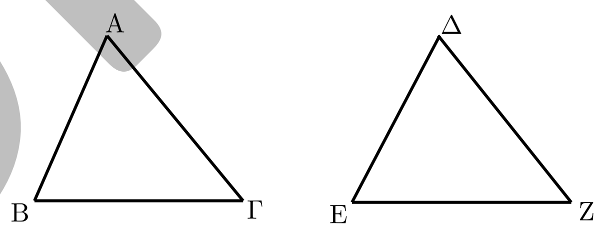


3.25

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, ABΓ and ΔEZ,	δύο τρίγωνα τὰ ABΓ, ΔEZ	ABΓ ve ΔEZ üçgenleri,
two sides, AB and AΓ,	τὰς δύο πλευρὰς τὰς AB, AΓ	iki AB ve AΓ kenarı,
to two sides, ΔE and ΔZ,	ταῖς δύο πλευραῖς ταῖς ΔE, ΔZ	iki ΔE ve ΔZ kenarına,
having equal,	ἴσας ἔχοντα	eşit olan,
either to either,	ἑκατέραν ἑκατέρᾳ,	her biri birine,
AB to ΔE	τὴν μὲν AB τῇ ΔE,	AB, ΔE kenarına
and AΓ to ΔZ;	τὴν δὲ AΓ τῇ ΔZ·	ve AΓ, ΔZ kenarına;
and the base BΓ	βάσις δὲ ἡ BΓ	ve BΓ tabanı
than the base EZ	βάσεως τῆς EZ	EZ 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 değildie,
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·	ama değil;
therefore it is not less,	οὐκ ἄρα ἐλάσσων ἐστὶν	dolayısıyla küçük değildir,
ΒΑΓ than angle ΕΔΖ.	ἡ ὑπὸ ΒΑΓ γωνία τῆς ὑπὸ ΕΔΖ.	ΒΑΓ, ΕΔΖ açısından.
And it was shown that	ἐδείχθη δέ, ὅτι	Ama gösterilmişti ki
it is not equal;	οὐδὲ ἴση·	eşit değildir;
therefore it is greater,	μείζων ἄρα ἐστὶν	dolayısıyla büyüktür,
ΒΑΓ than ΕΔΖ.	ἡ ὑπὸ ΒΑΓ τῆς ὑπὸ ΕΔΖ.	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.



3.26

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 kenarkar
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 kanrına
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 eşittit,
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 ΒΓΑ	ἴση ἄρα ἡ ὑπὸ ΗΓΒ γωνία	Eşittir dolayısıyla ΒΓΑ 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,
ΑΒ to ΔΕ.	ἡ ΑΒ τῇ ΔΕ.	ΑΒ, ΔΕ kenarına.
Therefore it is equal.	ἴση ἄρα.	Doalyısıyla eşittir.
It is also the case that	ἔστι δὲ καὶ	Ayrıca durum şöyledir;
ΒΓ to ΕΖ is equal;	ἡ ΒΓ τῇ ΕΖ ἴση·	ΒΓ, ΕΖ kenarına eşittir;
then the two ΑΒ and ΒΓ	δύο δὴ αἱ ΑΒ, ΒΓ	o zaman ΑΒ 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;
also the angle ΑΒΓ	καὶ γωνία ἡ ὑπὸ ΑΒΓ	ΑΒΓ açısı da
to the angle ΔΕΖ	γωνίᾳ τῇ ὑπὸ ΔΕΖ	ΔΕΖ açısına
is equal;	ἐστιν ἴση·	eşittir;
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 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 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 ΑΒ to ΔΕ;	ὡς ἡ ΑΒ τῇ ΔΕ·	ΑΒ, ΔΕ 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,
ΑΓ to ΔΖ,	ἡ μὲν ΑΓ τῇ ΔΖ,	ΑΓ, ΔΖ kenarına
and ΒΓ to ΕΖ,	ἡ δὲ ΒΓ τῇ ΕΖ	ve ΒΓ, ΕΖ kenarına
and also the remaining angle ΒΑΓ	καὶ ἔτι ἡ λοιπὴ γωνία ἡ ὑπὸ ΒΑΓ	ve kalan ΒΑΓ açısı da
to the remaining angle ΕΔΖ	τῇ λοιπῇ γωνίᾳ τῇ ὑπὸ ΕΔΖ	kalan ΕΔΖ açısına
is equal.	ἴση ἐστίν.	eşittir.

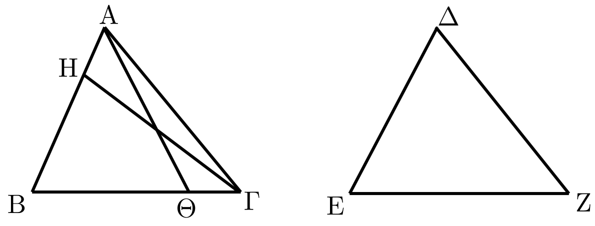
For, if it is unequal,	Εἰ γὰρ ἄνισός ἐστιν	Çünkü, eğer eşit değil ise,
ΒΓ to ΕΖ,	ἡ ΒΓ τῇ ΕΖ,	ΒΓ, ΕΖ kenarına,
one of them is greater.	μία αὐτῶν μείζων ἐστίν.	biri daha büyüktür.
Let be greater,	ἔστω μείζων,	Daha büyük olsun,
if possible,	εἰ δυνατόν,	eğer mümkünse,
ΒΓ,	ἡ ΒΓ,	ΒΓ,
and let there be cut	καὶ κείσθω	ve kesilmiş olsun
to ΕΖ equal	τῇ ΕΖ ἴση	ΕΖ kenarına eşit
ΒΘ,	ἡ ΒΘ,	ΒΘ,
and suppose there has been joined	καὶ ἐπεζεύχθω	ve kabul edilsin birleştirilmiş olduğu
ΑΘ.	ἡ ΑΘ.	ΑΘ kenarının.
Because also it is equal	καὶ ἐπεὶ ἴση ἐστὶν	Ayrıca eşit olduğundan
—ΒΘ to ΕΖ	ἡ μὲν ΒΘ τῇ ΕΖ	—ΒΘ, ΕΖ kenarına

[1]Fitzpatrick considers this way of denoting the line to be a 'mistake'; apparently he thinks Euclid should (and perhaps did originally) write ΗΒ, for parallelism with ΔΕ. But ΗΒ and ΒΗ are the same line, and for all we know, Euclid preferred to write ΒΗ 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.

and ΑΒ to ΔΕ,	ἡ δὲ ΑΒ τῇ ΔΕ,	ve ΑΒ, ΔΕ kenarına
then the two ΑΒ and ΒΘ	δύο δὴ αἱ ΑΒ, ΒΘ	ΑΒ ve ΒΘ ikilisi
to the two ΔΕ and ΕΖ	δυσὶ ταῖς ΔΕ, ΕΖ	ΔΕ ve ΕΖ ikilisine
are equal,	ἴσαι εἰσὶν	eşittirler,
either to either;	ἑκατέρα ἑκαρέρᾳ·	her biri birine;
and they contain equal angles;	καὶ γωνίας ἴσας περιέχουσιν·	ama içerirler eşit açıları;
therefore the base ΑΘ	βάσις ἄρα ἡ ΑΘ	dolayısıyla ΑΘ tabanı
to the base ΔΖ	βάσει τῇ ΔΖ	ΔΖ tabanına
is equal,	ἴση ἐστίν,	eşittir,
and the triangle ΑΒΘ	καὶ τὸ ΑΒΘ τρίγωνον	ve ΑΒΘ 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
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.



3.27

If on two STRAIGHTs	Ἐὰν εἰς δύο εὐθείας	Eğer iki doğru üzerine
a STRAIGHT falling	εὐθεῖα ἐμπίπτουσα	düşen bir doğrunun
the alternate angles	τὰς ἐναλλὰξ γωνίας	yaptığı ters açılar
equal to one another	ἴσας ἀλλήλαις	birbirine eşitse
make,	ποιῇ,	birbirine paralel olacak
parallel will be to one another	παράλληλοι ἔσονται ἀλλήλαις	doğrular.
the STRAIGHTs.	αἱ εὐθεῖαι.	

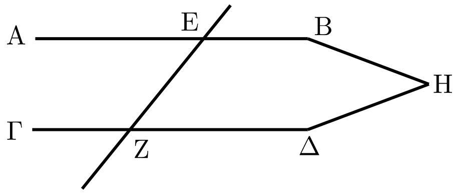
For, on the two STRAIGHTs	Εἰς γὰρ δύο εὐθείας	Çünkü, iki doğru üzerine,
AB and ΓΔ	τὰς ΑΒ, ΓΔ	AB ve ΓΔ,
[suppose] the STRAIGHT falling,	εὐθεῖα ἐμπίπτουσα	[kabul edilsin] düşen,
[namely] EZ,	ἡ ΕΖ	EZ doğrusunun,
the alternate angles	τὰς ἐναλλὰξ γωνίας	ters
AEZ and EZΔ	τὰς ὑπὸ ΑΕΖ, ΕΖΔ	AEZ ve EZΔ açılarını
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 ΑΒ τῇ ΓΔ.	paraleldir AB, ΓΔ doğrusuna.

For if not,	Εἰ γὰρ μή,	Çünkü eğer değilse,
extended,	ἐκβαλλόμεναι	uzatılmış,
AB and ΓΔ will meet,	αἱ ΑΒ, ΓΔ συμπεσοῦνται	AB ve ΓΔ buluşacaklar,
either in the B–Δ parts,	ἤτοι ἐπὶ τὰ Β, Δ μέρη	ya B–Δ parçalarında,
or in the A–Γ.	ἢ ἐπὶ τὰ Α, 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 Β, Δ μέρη	B–Δ parçalarında,
at H.	κατὰ τὸ Η.	H noktasında.
Of the triangle HEZ	τριγώνου δὴ τοῦ ΗΕΖ	HEZ üçgeninin
the exterior angle AEZ	ἡ ἐκτὸς γωνία ἡ ὑπὸ ΑΕΖ	AEZ dış açısı
is equal	ἴση ἐστὶ	eşittir
to the interior and opposite	τῇ ἐντὸς καὶ ἀπεναντίον	iç ve karşıt
EZH;	τῇ ὑπὸ ΕΖΗ·	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 ΑΒ, ΔΓ	AB ve ΓΔ,
extended,	ἐκβαλλόμεναι	uzatılmış,
meet in the B–Δ parts.	συμπεσοῦνται ἐπὶ τὰ Β, 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 Α, 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 ΑΒ 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 doğrunun
the alternate angles	τὰς ἐναλλὰξ γωνίας	yaptığı ters açılar
equal to one another	ἴσας ἀλλήλαις	birbirine eşitse
make,	ποιῇ,	birbirine paralel olacak
parallel will be to one another	παράλληλοι ἔσονται	doğrular;
the STRAIGHTs;	αἱ εὐθεῖαι·	— gösterilmesi gereken tam buydu.
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	



3.28

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 ΑΒ, ΓΔ	Çünkü, AB ve ΓΔ doğruları üzerine
the STRAIGHT falling—EZ—	εὐθεῖα ἐμπίπτουσα ἡ ΕΖ	düşen EZ doğrusu
the exterior angle EHB	τὴν ἐκτὸς γωνίαν τὴν ὑπὸ ΕΗΒ	EHB dış açısını
to the interior and opposite angle	τῇ ἐντὸς καὶ ἀπεναντίον γωνίᾳ	iç ve karşıt
ΗΘΔ	τῇ ὑπὸ ΗΘΔ	ΗΘΔ 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 ΗΘΔ,	τὰς ὑπὸ ΒΗΘ, ΗΘΔ	BHΘ ve ΗΘΔ açılarının,
to two RIGHTs	δυσὶν ὀρθαῖς	iki dik açıya
equal.	ἴσας·	equal.

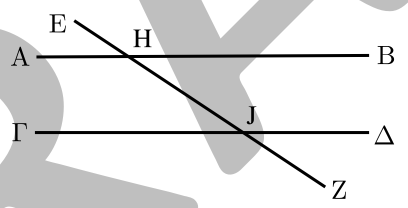
I say that	λέγω, ὅτι	İddia ediyorum ki
parallel is	παράλληλός ἐστιν	paraleldir
AB to ΓΔ.	ἡ ΑΒ τῇ ΓΔ.	AB, ΓΔ doğrusuna.

For, since equal is	Ἐπεὶ γὰρ ἴση ἐστὶν	Çünkü, eşit olduğundan
EHB to ΗΘΔ,	ἡ ὑπὸ ΕΗΒ τῇ ὑπὸ ΗΘΔ,	EHB, ΗΘΔ açısına,
while EHB to AHΘ	ἀλλὰ ἡ ὑπὸ ΕΗΒ τῇ ὑπὸ ΑΗΘ	aynı zamanda EHB, AHΘ açısına
is equal,	ἐστιν ἴση,	eşitken,
therefore also AHΘ to ΗΘΔ	καὶ ἡ ὑπὸ ΑΗΘ ἄρα τῇ ὑπὸ ΗΘΔ	dolayısıyla AHΘ de ΗΘΔ 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 ΑΒ τῇ ΓΔ.	paraleldirler dolayısıyla AB ve ΓΔ.

[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.

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



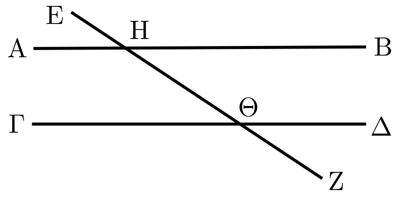
3.29

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.

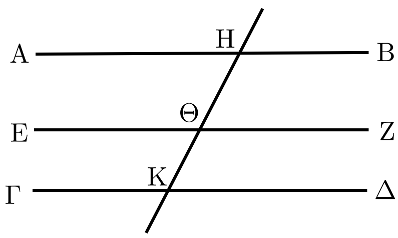
I say that	λέγω, ὅτι	İddia ediyorum ki
the alternate angles	τὰς ἐναλλὰξ γωνίας	ters
ΑΗΘ and ΗΘΔ	τὰς ὑπὸ ΑΗΘ, ΗΘΔ	ΑΗΘ ve ΗΘΔ açılarını
equal	ἴσας	eşit
it makes,	ποιεῖ	yapar,
and the exterior angle ΕΗΓ	καὶ τὴν ἐκτὸς γωνίαν τὴν ὑπὸ ΕΗΒ	ve ΕΗΓ dış açısını

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	αἱ δὲ ἀπ᾽ ἐλασσόνων	Ve küçük olanlardan,
are less	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 düşme-
But they do not fall together,	οὐ συμπίπτουσι δὲ	zler,
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.



3·30

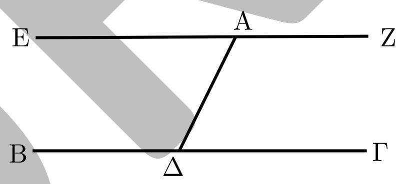
[Straights] to the same straight parallel also to one another are parallel.	Αἱ τῇ αὐτῇ εὐθείᾳ παράλληλοι καὶ ἀλλήλαις εἰσὶ παράλληλοι.	Aynı doğruya paralel doğrular birbirlerine de paraleldir.
Let be either of AB and ΓΔ to ΓΔ parallel.	Ἔστω ἑκατέρα τῶν AB, ΓΔ τῇ EZ παράλληλος·	Olsun AB ve ΓΔ doğrularının her biri, ΓΔ doğrusuna paralel.
I say that also AB to ΓΔ is parallel.	λέγω, ὅτι καὶ ἡ AB 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 HK.	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 AB, EZ εὐθεῖα ἐμπέπτωκεν ἡ HK, ἴση ἄρα ἡ ὑπὸ AHK τῇ ὑπὸ HΘZ. πάλιν, ἐπεὶ εἰς παραλλήλους εὐθείας τὰς EZ, ΓΔ εὐθεῖα ἐμπέπτωκεν ἡ HK, ἴση ἐστὶν ἡ ὑπὸ HΘZ τῇ ὑπὸ HKΔ. ἐδείχθη δὲ καὶ ἡ ὑπὸ AHK τῇ ὑπὸ HΘZ ἴση. καὶ ἡ ὑπὸ AHK ἄρα τῇ ὑπὸ HKΔ ἐστιν ἴση· καί εἰσιν ἐναλλάξ. παράλληλος ἄρα ἐστὶν ἡ AB 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.



3·31

Through the given point to the given straight parallel	Διὰ τοῦ δοθέντος σημείου τῇ δοθείσῃ εὐθείᾳ παράλληλον	Verilen bir noktadan verilen bir doğruya paralel

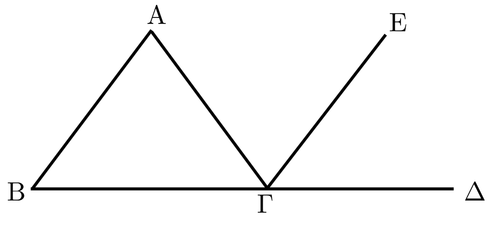
a straight line to draw.	εὐθεῖαν γραμμὴν ἀγαγεῖν.	bir doğru çizmek.
Let be	Ἔστω	Olsun
the given point A,	τὸ μὲν δοθὲν σημεῖον τὸ A,	verilen nokta A,
and the given STRAIGHT BΓ.	ἡ δὲ δοθεῖσα εὐθεῖα ἡ BΓ·	ve verilen doğru BΓ.
It is necessary then	δεῖ δὴ	Şimdi gereklidir
through the point A	διὰ τοῦ A σημείου	A noktasından
to the STRAIGHTBΓ parallel	τῇ BΓ εὐθείᾳ παράλληλον	BΓ doğrusuna paralel
a straight line to draw.	εὐθεῖαν γραμμὴν ἀγαγεῖν.	bir doğru çizmek.
Suppose there has been chosen	Εἰλήφθω	Varsayılsın seçilmiş olduğu
on BΓ	ἐπὶ τῆς BΓ	BΓ üzerinde
a random point Δ,	τυχὸν σημεῖον τὸ Δ,	rastgele bir Δ noktasının,
and there has been joined AΔ.	καὶ ἐπεζεύχθω ἡ AΔ·	ve AΔ doğrusunun birleştirilmiş olduğu,
and there has been constructed,	καὶ συνεστάτω	
on the STRAIGHT ΔA,	πρὸς τῇ ΔA εὐθείᾳ	ve inşa edillmiş olduğu,
and at the point A of it,	καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ A	ΔA doğrusunda,
to the angle AΔΓ equal,	τῇ ὑπὸ AΔΓ γωνίᾳ ἴση	ve onun A noktasında,
ΔAE;	ἡ ὑπὸ ΔAE·	AΔΓ açısına eşitl,
and suppose there has been extended,	καὶ ἐκβεβλήσθω	ΔAE açısının;
in STRAIGHTs with EA,	ἐπ᾽ εὐθείας τῇ EA	ve kabul edilsin uzatılmış olsun,
the STRAIGHT AZ.	εὐθεῖα ἡ AZ.	EA ile aynı doğruda,
		AZ doğrusu.
And because	Καὶ ἐπεὶ	Ve çünkü
on the two STRAIGHTs BΓ and EZ	εἰς δύο εὐθείας τὰς BΓ, EZ	BΓ ve EZ doğruları üzerine
the straight line falling, AΔ,	εὐθεῖα ἐμπίπτουσα ἡ AΔ	düşerken AΔ doğrusu,
the alternate angles	τὰς ἐναλλὰξ γωνίας	ters
EAΔ and AΔΓ	τὰς ὑπὸ EAΔ, AΔΓ	EAΔ ve AΔΓ açılarını
equal to one another has made,	ἴσας ἀλλήλαις πεποίηκεν,	eşit yapmıştır birbirine,
parallel therefore is EAZ to BΓ.	παράλληλος ἄρα ἐστὶν ἡ EAZ τῇ BΓ.	paraleldir dolayısıyla EAZ, BΓ doğrusuna.
Therefore, through the given point A,	Διὰ τοῦ δοθέντος ἄρα σημείου τοῦ A	Dolayısıyla, verilen A noktasından,
to the given STRAIGHT BΓ parallel,	τῇ δοθείσῃ εὐθείᾳ τῇ BΓ παράλληλος	verilen BΓ doğrusuna paralel,
a straight line has been drawn, EAZ;	εὐθεῖα γραμμὴ ἦκται ἡ EAZ·	bir doğru EAZ, çizilmiş oldu;
—just what it was necessary to do.	ὅπερ ἔδει ποιῆσαι.	— yapılması gereken tam buydu.



3.32

Of any triangle	Παντὸς τριγώνου	Herhangi bir üçgenin
one of the sides being extended,	μιᾶς τῶν πλευρῶν προσεκβληθείσης	kenarlarından biri uzatıldığında,
the exterior angle	ἡ ἐκτὸς γωνία	dış açı
to the two opposite interior angles	δυσὶ ταῖς ἐντὸς καὶ ἀπεναντίον	iki karşıt iç açıya
is equal,	ἴση ἐστίν,	eşittir,
and the triangle's three interior angles	καὶ αἱ ἐντὸς τοῦ τριγώνου τρεῖς γωνίαι	ve üçgenin üç iç açısı
to two RIGHTs equal are.	δυσὶν ὀρθαῖς ἴσαι εἰσίν.	iki dik açıya eşittir.

Let there be the triangle ΑΒΓ, and suppose there has been extended its one side, ΒΓ, to Δ;	Ἔστω τρίγωνον τὸ ΑΒΓ, καὶ προσεκβεβλήσθω αὐτοῦ μία πλευρὰ ἡ ΒΓ ἐπὶ τὸ Δ·	Verilmiş olsun ΑΒΓ üçgeni, ve varsayılsın uzatılmış olduğu bir ΒΓ kenarının Δ noktasına.
I say that the exterior angle ΑΓ is equal to the two interior and opposite angles ΓΑΒ and ΑΒΓ, and the triangle's three interior angles ΑΒΓ, ΒΓΑ, and ΓΑΒ to two RIGHTs equal are.	λέγω, ὅτι ἡ ἐκτὸς γωνία ἡ ὑπὸ ΑΓΔ ἴση ἐστὶ 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.	İddia ediyorum ki ΑΓΔ dış açısı eşittir iki iç ve karşıt ΓΑΒ ve ΑΒΓ açısına, ve üçgenin üç iç açısı ΑΒΓ, ΒΓΑ ve ΓΑΒ, iki dik açıya eşittir.
For, suppose there has been drawn through the point Γ to the STRAIGHT ΑΒ parallel ΓΕ.	Ἤχθω γὰρ διὰ τοῦ Γ σημείου τῇ ΑΒ εὐθείᾳ παράλληλος ἡ ΓΕ.	Çünkü, varsayılsın çizilmiş olduğu Γ noktasından ΑΒ doğrusuna paralel ΓΕ doğrusunun.
And since parallel is ΑΒ to ΓΕ, and on these has fallen ΑΓ, the alternate angles ΒΑΓ and ΑΓΕ equal to one another are. Moreover, since parallel is ΑΒ to ΓΕ, and on these has fallen the STRAIGHT ΒΔ, the exterior angle ΕΓΔ is equal to the interior and opposite ΑΒΓ. And it was shown that also ΑΓΕ to ΒΑΓ [is] equal. Therefore the whole angle ΑΓΔ is equal to the two interior and opposite angles ΒΑΓ and ΑΒΓ.	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 ΑΒ, ΓΕ doğrusuna, ve bunların üzerine düştüğünden ΑΓ, ters ΒΑΓ ve ΑΓΕ açıları eşittirler birbirlerine. Dahası, paralel olduğundan ΑΒ, ΓΕ doğrusuna, and bunların üzerine düştüğünden ΒΔ doğrusu, ΕΓΔ dış açısı eşittir iç ve karşıt ΑΒΓ açısına. Ve gösterilmişti ki ΑΓΕ da ΒΑΓ açısına eşittir. Dolayısıyla açının tamamı ΑΓΔ eşittir iç ve karşıt ΒΑΓ ve ΑΒΓ açılarına.
Let be added in common ΑΓΒ; Therefore ΑΓΔ and ΑΓΒ to the three ΑΒΓ, ΒΓΑ, and ΓΑΒ equal are. However, ΑΓΔ and ΑΓΒ to two RIGHTs equal are; also ΑΓΒ, ΓΒΑ, and ΓΑΒ 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 ΑΓΒ ortak olarak; Dolayısıyla ΑΓΔ ve ΑΓΒ açıları ΑΒΓ, ΒΓΑ ve ΓΑΒ üçlüsüne eşittir. Fakat, ΑΓΔ ve ΑΓΒ açıları iki dik açıya eşittir; ΑΓΒ, ΓΒΑ ve ΓΑΒ 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.



3.33

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 AΓ and BΔ.

Ἔστωσαν
ἴσαι τε καὶ παράλληλοι
αἱ AB, ΓΔ,
καὶ ἐπιζευγνύτωσαν αὐτὰς
ἐπὶ τὰ αὐτὰ μέρη
εὐθεῖαι αἱ AΓ, BΔ·

Olsun
eşit ve paraleller
AB ve ΓΔ,
ve bunların birleştirsin
aynı taraflarını
AΓ ve BΔ doğruları.

I say that
also AΓ and BΔ
equal and parallel are.

λέγω, ὅτι
καὶ αἱ AΓ, BΔ
ἴσαι τε καὶ παράλληλοί εἰσιν.

İddia ediyorum ki
AΓ ve BΔ da
eşit ve paraleldirler.

Suppose there has been joined BΓ.
And since parallel is AB to ΓΔ,
and on these has fallen BΓ,
the alternate angles ABΓ and BΓΔ
equal to one another are.
And since equal is AB to ΓΔ,
and common [is] BΓ,
then the two AB and BΓ
to the two BΓ and ΓΔ
equal are;
also angle ABΓ
to angle BΓΔ
[is] equal;
therefore the base AΓ
to the base BΔ
is equal,
and the triangle ABΓ
to the triangle BΓΔ
is equal,
and the remaining angles
to the remaining angles
equal will be,
either to either,
which the equal sides subtend;
equal therefore
the AΓB angle to ΓBΔ.
And since on the two straights
AΓ and BΔ
the straight falling—BΓ—
alternate angles equal to one another
has made,
parallel therefore is AΓ to BΔ.
And it was shown to it also equal.

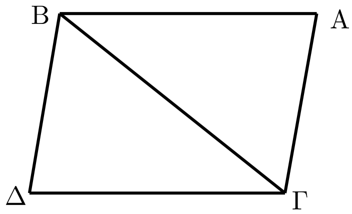
Ἐπεζεύχθω ἡ BΓ.
καὶ ἐπεὶ παράλληλός ἐστιν ἡ AB τῇ ΓΔ,
καὶ εἰς αὐτὰς ἐμπέπτωκεν ἡ BΓ,
αἱ ἐναλλὰξ γωνίαι αἱ ὑπὸ ABΓ, BΓΔ
ἴσαι ἀλλήλαις εἰσίν.
καὶ ἐπεὶ ἴση ἐστὶν ἡ AB τῇ ΓΔ
κοινὴ δὲ ἡ BΓ,
δύο δὴ αἱ AB, BΓ
δύο ταῖς BΓ, ΓΔ
ἴσαι εἰσίν·
καὶ γωνία ἡ ὑπὸ ABΓ
γωνίᾳ τῇ ὑπὸ BΓΔ
ἴση·
βάσις ἄρα ἡ AΓ
βάσει τῇ BΔ
ἐστιν ἴση,
καὶ τὸ ABΓ τρίγωνον
τῷ BΓΔ τριγώνῳ
ἴσον ἐστίν,
καὶ αἱ λοιπαὶ γωνίαι
ταῖς λοιπαῖς γωνίαις
ἴσαι ἔσονται
ἑκατέρα ἑκατέρᾳ,
ὑφ᾽ ἃς αἱ ἴσαι πλευραὶ ὑποτείνουσιν·
ἴση ἄρα
ἡ ὑπὸ AΓB γωνία τῇ ὑπὸ ΓBΔ.
καὶ ἐπεὶ εἰς δύο εὐθείας
τὰς AΓ, BΔ
εὐθεῖα ἐμπίπτουσα ἡ BΓ
τὰς ἐναλλὰξ γωνίας ἴσας ἀλλήλαις
πεποίηκεν,
παράλληλος ἄρα ἐστὶν ἡ AΓ τῇ BΔ.
ἐδείχθη δὲ αὐτῇ καὶ ἴση.

Varsayılsın birleştirilmiş olduğu BΓ doğrusunun.
Ve paralel olduğundan AB, ΓΔ doğrusuna,
ve bunların üzerine düştüğünden BΓ,
ters ABΓ ve BΓΔ açıları
birbirlerine eşittirler.
Ve eşit olduğundan AB, ΓΔ doğrusuna,
ve BΓ ortak,
AB ve BΓ ikilisi
BΓ ve ΓΔ ikilisine
eşittir;
ABΓ açısı da
BΓΔ açısına
eşittir;
dolayısıyla AΓ tabanı
BΔ tabanına
eşittir,
ve ABΓ üçgeni
BΓΔ üçgenine
eşittir,
ve kalan açılar
kalan açılara
eşit olacaklar,
her biri birine,
eşit kenarları görenler;
eşittir dolayısıyla
AΓB, ΓBΔ açısına.
Ve üzerine iki
AΓ ve BΔ doğrularının,
düşen doğru—BΓ—
birbirine eşit ters açılar
yapmıştır,
paraleldir dolayısıyla AΓ, BΔ 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.

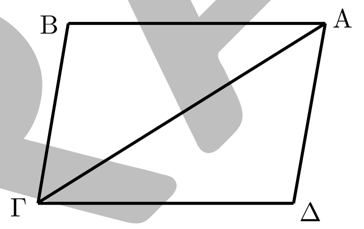
Dolayısıyla eşit ve paralellerin aynı taraflarını birleştiren doğruların
kendileri de eşit ve paraleldirler;
— gösterilmesi gereken tam buydu.



3.34

Of parallelogram areas,	Τῶν παραλληλογράμμων χωρίων	Paralelkenar alanların,
opposite sides and angles	αἱ ἀπεναντίον πλευραί τε καὶ γωνίαι	karşıt kenar ve açıları
are equal to one another,	ἴσαι ἀλλήλαις εἰσίν,	eşittir birbirine,
and the diameter cuts them in two.	καὶ ἡ διάμετρος αὐτὰ δίχα τέμνει.	ve köşegen onları ikiye böler.
Let there be	Ἔστω	Verilmiş olsun
a parallelogram area	παραλληλόγραμμον χωρίον	bir paralelkenar alan
ΑΓΔΒ;	τὸ ΑΓΔΒ,	ΑΓΔΒ;
a diameter of it, ΒΓ.	διάμετρος δὲ αὐτοῦ ἡ ΒΓ·	ve onun bir köşegeni, ΒΓ.
I say that	λέγω, ὅτι	iddia ediyorum ki
of the ΑΓΔΒ parallelogram	τοῦ ΑΓΔΒ παραλληλογράμμου	ΑΓΔΒ paralelkenarının
the opposite sides and angles	αἱ ἀπεναντίον πλευραί τε καὶ γωνίαι	karşıt kenar ve açıları
equal to one another are,	ἴσαι ἀλλήλαις εἰσίν,	eşittir birbirine,
and the ΒΓ diameter it cuts in two.	καὶ ἡ ΒΓ διάμετρος αὐτὸ δίχα τέμνει.	ve ΒΓ köşegeni onu ikiye böler.
For, since parallel is	Ἐπεὶ γὰρ παράλληλός ἐστιν	Çümkü, paralel olduğundans
ΑΒ to ΓΔ,	ἡ ΑΒ τῇ ΓΔ,	ΑΒ, ΓΔ doğrusuna,
and on these has fallen	καὶ εἰς αὐτὰς ἐμπέπτωκεν	bunların üzerine düştüğünden
a STRAIGHT, ΒΓ,	εὐθεῖα ἡ ΒΓ,	bir ΒΓ doğrusu,
the alternate angles ΑΒΓ and ΒΓΔ	αἱ ἐναλλὰξ γωνίαι αἱ ὑπὸ ΑΒΓ, ΒΓΔ	ters ΑΒΓ ve ΒΓΔ açıları
equal to one another are.	ἴσαι ἀλλήλαις εἰσίν.	eşittir birbirlerine.
Moreover, since parallel is	πάλιν ἐπεὶ παράλληλός ἐστιν	Dahası, paralel olduğundan
ΑΓ to ΒΔ,	ἡ ΑΓ τῇ ΒΔ,	ΑΓ, ΒΔ doğrusuna,
and on these has fallen	καὶ εἰς αὐτὰς ἐμπέπτωκεν	ve bunların üzerine düştüğünden
ΒΓ,	ἡ ΒΓ,	ΒΓ,
the alternate angles ΑΓΒ and ΓΒΔ	αἱ ἐναλλὰξ γωνίαι αἱ ὑπὸ ΑΓΒ, ΓΒΔ	ters açılar ΑΓΒ ve ΓΒΔ
equal to one another are.	ἴσαι ἀλλήλαις εἰσίν.	eşittir birbirlerine..
Then two triangles there are,	δύο δὴ τρίγωνά ἐστι	Şimdi iki üçgen vardir;
ΑΒΓ and ΒΓΑ,	τὰ ΑΒΓ, ΒΓΔ	ΑΒΓ ve ΒΓΑ,
the two angles ΑΒΓ and ΒΓΑ	τὰς δύο γωνίας τὰς ὑπὸ ΑΒΓ, ΒΓΑ	iki ΑΒΓ ve ΒΓΑ açıları
to the two ΒΓΔ and ΓΒΔ	δυσὶ ταῖς ὑπὸ ΒΓΔ, ΓΒΔ	iki ΒΓΔ ve ΓΒΔ açılarına
equal having,	ἴσας ἔχοντα	eşit olan,
either to either,	ἑκατέραν ἑκατέρᾳ	her biri birine,
and one side to one side equal,	καὶ μίαν πλευρὰν μιᾷ πλευρᾷ ἴσην	ve bir kenarı, bir kenarına eşit olan,
that near the equal angles,	τὴν πρὸς ταῖς ἴσαις γωνίαις	eşit açıların yanında olan,
their common ΒΓ;	κοινὴν αὐτῶν τὴν ΒΓ·	onların ortak ΒΓ kenarı;
also then the remaining sides	καὶ τὰς λοιπὰς ἄρα πλευρὰς	o zaman kalan kenarları da
to the remaining sides	ταῖς λοιπαῖς	kalan kenarlarına
equal they will have,	ἴσας ἕξει	eşit olacaklar ,
either to either,	ἑκατέραν ἑκατέρᾳ	her biri birine,
and the remaining angle	καὶ τὴν λοιπὴν γωνίαν	ve kalan açı
to the remaining angle;	τῇ λοιπῇ γωνίᾳ·	kalan açıya;
equal, therefore,	ἴση ἄρα	eşit, dolayısıyla,
the ΑΒ side to ΓΔ,	ἡ μὲν ΑΒ πλευρὰ τῇ ΓΔ,	ΑΒ kenarı ΓΔ kenarına,
and ΑΓ to ΒΔ,	ἡ δὲ ΑΓ τῇ ΒΔ,	ve ΑΓ, ΒΔ kenarına,
and yet equal is the ΒΑΓ angle	καὶ ἔτι ἴση ἐστὶν ἡ ὑπὸ ΒΑΓ γωνία	ve eşittir ΒΑΓ açısı
to ΓΔΒ.	τῇ ὑπὸ ΓΔΒ.	ΓΔΒ açısına.
And since equal is the ΑΒΓ angle	καὶ ἐπεὶ ἴση ἐστὶν ἡ μὲν ὑπὸ ΑΒΓ γωνία	Ve eşit olduğundan ΑΒΓ,
to ΒΓΔ,	τῇ ὑπὸ ΒΓΔ,	ΒΓΔ açısına,
and ΓΒΔ to ΑΓΒ,	ἡ δὲ ὑπὸ ΓΒΔ τῇ ὑπὸ ΑΓΒ,	ve ΓΒΔ, ΑΓΒ açısına,
therefore the whole ΑΒΔ	ὅλη ἄρα ἡ ὑπὸ ΑΒΔ	dolayısıyla açının tamamı ΑΒΔ,

to the whole ΑΓΔ	ὅλῃ τῇ ὑπὸ ΑΓΔ	açının tamamına, ΑΓΔ
is equal.	ἐστιν ἴση.	eşittir.
And was shown also	ἐδείχθη δὲ καὶ	Ve gösterilmişti ayrıca
ΒΑΓ to ΓΔΒ equal.	ἡ ὑπὸ ΒΑΓ τῇ ὑπὸ ΓΔΒ ἴση.	ΒΑΓ ile ΓΔΒ açısının eşitliği.
Therefore, of parallelogram areas,	Τῶν ἄρα παραλληλογράμμων χωρίων	Dolayısıyla,paralelkenar alanların,
opposite sides and angles	αἱ ἀπεναντίον πλευραί τε καὶ γωνίαι	karşıt kenar ve açıları
equal to one another are.	ἴσαι ἀλλήλαις εἰσίν.	eşittir birbirlerine.
I say then that	Λέγω δή, ὅτι	Şimdi iddia ediyorum ki
also the diameter them cuts in two.	καὶ ἡ διάμετρος αὐτὰ δίχα τέμνει.	köşegen de onları ikiye keser.
For, since equal is ΑΒ to ΓΔ,	ἐπεὶ γὰρ ἴση ἐστὶν ἡ ΑΒ τῇ ΓΔ,	Çünkü, eşit olduğundan ΑΒ, ΓΔ kenarına,
and common [is] ΒΓ,	κοινὴ δὲ ἡ ΒΓ,	ve ΒΓ ortak,
the two ΑΒ and ΒΓ	δύο δὴ αἱ ΑΒ, ΒΓ	ΑΒ ve ΒΓ ikilisi
to the two ΓΔ and ΒΓ	δυσὶ ταῖς ΓΔ, ΒΓ	- ΓΔ ve ΒΓ ikilisine
equal are,	ἴσαι εἰσὶν	eşittirler,
either to either;	ἑκατέρα ἑκατέρᾳ·	her biri birine;
and angle ΑΒΓ	καὶ γωνία ἡ ὑπὸ ΑΒΓ	ve ΑΒΓ açısı
to angle ΒΓΔ	γωνίᾳ τῇ ὑπὸ ΒΓΔ	ΒΓΔ açısına
equal.	ἴση.	eşittir.
Therefore also the base ΑΓ	καὶ βάσις ἄρα ἡ ΑΓ	Dolayısıyla ΑΓ tabanı da
to the base ΔΒ	τῇ ΔΒ	ΔΒ tabanına
equal.	ἴση.	eşittir.
Therefore also the ΑΒΓ triangle	καὶ τὸ ΑΒΓ [ἄρα] τρίγωνον	Dolayısıyla ΑΒΓ üçgeni de
to the ΒΓΔ triangle	τῷ ΒΓΔ τριγώνῳ	ΒΓΔ üögenine
is equal.	ἴσον ἐστίν.	eşittir.
Therefore the ΒΓ diameter cuts in two	Ἡ ἄρα ΒΓ διάμετρος δίχα τέμνει	Dolayısıyla ΒΓ köşegeni ikiye böler
the ΑΒΓΔ parallelogram;	τὸ ΑΒΓΔ παραλληλόγραμμον·	ΑΒΓΔ paralelkenarını;
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	— gösterilmesi gereken tam buydu.



3·35

Parallelograms	Τὰ παραλληλόγραμμα	Paralelkenarlar;
on the same base being	τὰ ἐπὶ τῆς αὐτῆς βάσεως ὄντα	aynı tabanda olan
and in the same parallels	καὶ ἐν ταῖς αὐταῖς παραλλήλοις	ve aynı paralellerde olanlar,
equal to one another are.	ἴσα ἀλλήλοις ἐστίν.	birbirlerine eşittir.
Let there be	Ἔστω	Verilmiş olsun
parallelograms	παραλληλόγραμμα	paralelkenarlar,
ΑΒΓΔ and ΕΒΓΔ	τὰ ΑΒΓΔ, ΕΒΓΖ	ΑΒΓΔ ve ΕΒΓΔ,
on the same base, ΓΒ,	ἐπὶ τῆς αὐτῆς βάσεως τῆς ΒΓ	aynı ΓΒ tabanında,
and in the same parallels,	καὶ ἐν ταῖς αὐταῖς παραλλήλοις	ve aynı
ΑΖ and ΒΓ.	ταῖς ΑΖ, ΒΓ·	ΑΖ ve ΒΓ paralellerinde.
I say that	λέγω, ὅτι	İddia ediyorum ki
equal is	ἴσον ἐστὶ	eşittir
ΑΒΓΔ	τὸ ΑΒΓΔ	ΑΒΓΔ
to the trapezium ΕΒΓΖ.	τῷ ΕΒΓΖ παραλληλογράμμῳ.	ΕΒΓΖ yamuğuna.
For, since	Ἐπεὶ γὰρ	Çünkü
a parallelogram is ΑΒΓΔ,	παραλληλόγραμμόν ἐστι τὸ ΑΒΓΔ,	bir paralelkenar olduğundan 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.
Is also ΑΒ to ΔΓ equal.
Then the two ΕΑ and ΑΒ
to the two ΖΔ and ΔΓ
equal are
either to either;
also angle ΖΔΓ
to ΕΑΒ
is equal,
the exterior to the interior;
therefore the base ΕΒ
to the base ΖΓ
is equal,
and triangle ΕΑΒ
to triangle ΔΖΓ
equal will be;
suppose has been removed, commonly, ΔΗΕ;
therefore the trapezium ΑΒΗΔ that remains
to the trapezium ΕΗΓΖ that remains
is equal;
let be added in common
the triangle ΗΒΓ;
therefore the trapezium ΑΒΓΔ as a whole
to the trapezium ΕΒΓΖ as a whole
is equal.

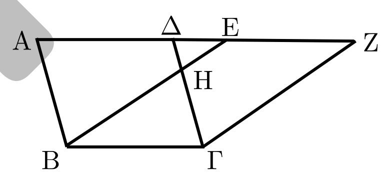
ἴση ἐστὶν ἡ ΑΔ τῇ ΒΓ.
διὰ τὰ αὐτὰ δὴ καὶ
ἡ ΕΖ τῇ ΒΓ ἐστιν ἴση·
ὥστε καὶ ἡ ΑΔ τῇ ΕΖ ἐστιν ἴση·
καὶ κοινὴ ἡ ΔΕ·
ὅλη ἄρα ἡ ΑΕ
ὅλῃ τῇ ΔΖ
ἐστιν ἴση.
ἔστι δὲ καὶ ἡ ΑΒ τῇ ΔΓ ἴση·
δύο δὴ αἱ ΕΑ, ΑΒ
δύο ταῖς ΖΔ, ΔΓ
ἴσαι εἰσὶν
ἑκατέρα ἑκατέρᾳ·
καὶ γωνία ἡ ὑπὸ ΖΔΓ
γωνίᾳ τῇ ὑπὸ ΕΑΒ
ἐστιν ἴση
ἡ ἐκτὸς τῇ ἐντός·
βάσις ἄρα ἡ ΕΒ
βάσει τῇ ΖΓ
ἴση ἐστίν,
καὶ τὸ ΕΑΒ τρίγωνον
τῷ ΔΖΓ τριγώνῳ
ἴσον ἔσται·
κοινὸν ἀφῃρήσθω τὸ ΔΗΕ·
λοιπὸν ἄρα τὸ ΑΒΗΔ τραπέζιον
λοιπῷ τῷ ΕΗΓΖ τραπεζίῳ
ἐστὶν ἴσον·
κοινὸν προσκείσθω τὸ ΗΒΓ τρίγωνον·
ὅλον ἄρα τὸ ΑΒΓΔ παραλληλόγραμμον
ὅλῳ τῷ ΕΒΓΖ παραλληλογράμμῳ
ἴσον ἐστίν.

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.
ΑΒ da ΔΓ kenarına eşittir.
O zaman ΕΑ ve ΑΒ ikilisi
ΖΔ ve ΔΓ ikilisine
eşittirler
her biri birine;
ve ΖΔΓ açısı da
ΕΑΒ açısına
eşittirl,
dış açı, iç açıya;
dolayısıyla ΕΒ tabanı
ΖΓ tabanına
eşittir,
ve ΕΑΒ üçgeni
ΔΖΓ üçgenine
eşit olacak;
kaldırılmış olsun, ortak olarak,
ΔΗΕ;
dolayısıyla kalan ΑΒΗΔ yamuğu
kalan ΕΗΓΖ yamuğuna
eşittir;
eklenmiş olsun her ikisine birden
ΗΒΓ üçgeni;
dolayısıyla ΑΒΓΔ yamuğunun tamamı
ΕΒΓΖ yamuğunun 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.



3.36

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.

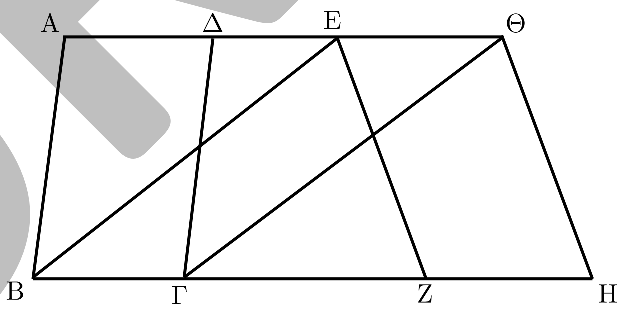
Paralelkenarlar;
eşit tabanlarda olanlar
ve aynı paralellerde olanlar
eşittirler birbirlerine.

Let there be
parallelograms
ΑΒΓΔ and ΕΖΗΘ
on equal bases,
ΒΓ and ΖΗ,
and in the same parallels,
ΑΘ and ΒΗ.

Ἔστω
παραλληλόγραμμα
τὰ ΑΒΓΔ, ΕΖΗΘ
ἐπὶ ἴσων βάσεων ὄντα
τῶν ΒΓ, ΖΗ
καὶ ἐν ταῖς αὐταῖς παραλλήλοις
ταῖς ΑΘ, ΒΗ·

Verilmiş olsun
paralelkenarlar
ΑΒΓΔ veΕΖΗΘ
eşit
ΒΓ ve ΖΗ tabanlarında,
ve aynı
ΑΘ ve ΒΗ paralellerinde.

I say that	λέγω, ὅτι	İddia ediyorum ki
equal is	ἴσον ἐστὶ	eşittir
parallelogram ΑΒΓΔ	τὸ ΑΒΓΔ παραλληλόγραμμον	ΑΒΓΔ,
to ΕΖΗΘ.	τῷ ΕΖΗΘ.	ΕΖΗΘ paralelkenarına.
For, suppose have been joined	Ἐπεζεύχθωσαν γὰρ	Çünkü, varsayılsın birleştirilmiş olduğu
ΒΕ and ΓΘ.	αἱ ΒΕ, ΓΘ.	ΒΕ 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 ΑΒΓΘ.	καί ἐστιν ἴσον τῷ ΑΒΓΔ·	Ve eşittir ΑΒΓΘ 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 paralelleri,
as it it is, ΒΓ and ΑΘ.	ἐστὶν αὐτῷ ταῖς ΒΓ, ΑΘ.	ΒΓ ve ΑΘ vardır.
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.



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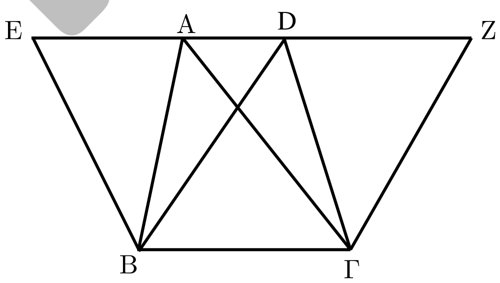
Triangles	Τὰ τρίγωνα	Üçgenler;
that are on the same base	τὰ ἐπὶ τῆς αὐτῆς βάσεως ὄντα	aynı tabanda
and in the same parallels	καὶ ἐν ταῖς αὐταῖς παραλλήλοις	ve aynı paralellerde olanlar,
are equal to one another.	ἴσα ἀλλήλοις ἐστίν.	eşittir birbirlerine.
Let there be	Ἔστω	Verilmiş olsun
triangles ΑΒΓ 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.

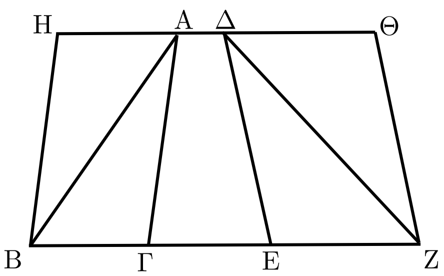
I say that	λέγω, ὅτι	İddia ediyorum ki
equal is	ἴσον ἐστὶ	eşittir
triangle ΑΒΓ	τὸ ΑΒΓ τρίγωνον	ΑΒΓ üçgeni
to triangle ΔΒΓ.	τῷ ΔΒΓ τριγώνῳ.	ΔΒΓ üçgenine.
Suppose has been extended	Ἐκβεβλήσθω	Varsayılsın uzatılmış olduğu
ΑΔ on both sides to Ε and Ζ,	ἡ ΑΔ ἐφ᾽ ἑκάτερα τὰ μέρη ἐπὶ τὰ Ε, Ζ,	ΑΔ doğrusunun her iki kenarda Ε ve Ζ noktalarına,
and through Β,	καὶ διὰ μὲν τοῦ Β	ve Β noktasından,
parallel to ΓΑ	τῇ ΓΑ παράλληλος	ΓΑ kenarına paralel
has been drawn ΒΕ,	ἤχθω ἡ ΒΕ,	ΒΕ çizilmiş olsun,
and through Γ	δὶα δὲ τοῦ Γ	ve Γ noktasından
parallel to ΒΔ	τῇ ΒΔ παράλληλος	ΒΔ kenarına papalel
has been drawn ΓΖ.	ἤχθω ἡ ΓΖ.	ΓΖ çizilmiş olsun.
Therefore a parallelogram	παραλληλόγραμμον ἄρα	Dolayısıyla birer paralelkenardır
is either of ΕΒΓΑ and ΔΒΓΖ;	ἐστὶν ἑκάτερον τῶν ΕΒΓΑ, ΔΒΓΖ·	ΕΒΓΑ ile ΔΒΓΖ;
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
ΒΓ,	τῆς ΒΓ	ΒΓ tabanında,
and in the same parallels,	καὶ ἐν ταῖς αὐταῖς παραλλήλοις	ve aynı,
ΒΓ and ΕΖ;	ταῖς ΒΓ, ΕΖ·	ΒΓ ve ΕΖ paralellerinde oldukları için;
and [it] is	καί ἐστι	ve
of the parallelogram ΕΒΓΑ	τοῦ μὲν ΕΒΓΑ παραλληλογράμμου	ΕΒΓΑ paralelkenarının
half	ἥμισυ	yarısı
—the triangle ΑΒΓ;	τὸ ΑΒΓ τρίγωνον·	— ΑΒΓ üçgenidir;
for the diameter ΑΒ cuts it in two;	ἡ γὰρ ΑΒ διάμετρος αὐτὸ δίχα τέμνει·	ΑΒ köşegeni onu ikiye kestiği için;
and of the parallelogram ΔΒΓΖ	τοῦ δὲ ΔΒΓΖ παραλληλογράμμου	ΔΒΓΖ paralelkenarının
half	ἥμισυ	yarısı
—the triangle ΔΒΓ;	τὸ ΔΒΓ τρίγωνον·	— ΔΒΓ 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 ΑΒΓ to the triangle ΔΒΓ.	τὸ ΑΒΓ τρίγωνον τῷ ΔΒΓ τριγώνῳ.	ΑΒΓ üçgeni ΔΒΓ 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.



3.38

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 ΑΒΓ and ΔΕΖ	τρίγωνα τὰ ΑΒΓ, ΔΕΖ	ΑΒΓ ve ΔΕΖ üçgenleri

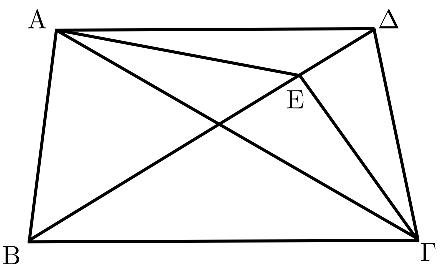
on equal bases ΒΓ and ΕΖ and in the same parallels ΒΖ and ΑΔ.	επὶ ἴσων βάσεων τῶν ΒΓ, ΕΖ καὶ ἐν ταῖς αὐταῖς παραλλήλοις ταῖς ΒΖ, ΑΔ·	eşit ΒΓ ve ΕΖ tabanlarında ve aynı ΒΖ ve ΑΔ paralellerinde.
I say that equal is triangle ΑΒΓ to triangle ΔΕΖ.	λέγω, ὅτι ἴσον ἐστὶ τὸ ΑΒΓ τρίγωνον τῷ ΔΕΖ τριγώνῳ.	İddia ediyorum ki eşittir ΑΒΓ üçgeni ΔΕΖ üçgenine.
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.	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.	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.
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.	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.	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.
Therefore triangles that are on equal bases and in the same parallels are equal to one another; —just what it was necessary to show.	Τὰ ἄρα τρίγωνα τὰ ἐπὶ ἴσων βάσεων ὄντα καὶ ἐν ταῖς αὐταῖς παραλλήλοις ἴσα ἀλλήλοις ἐστίν· ὅπερ ἔδει δεῖξαι.	Dolayısıyla üçgenler; eşit tabanlarda ve aynı paralelerde olanlar, eşittir birbirlerine; — gösterilmesi gereken tam buydu.



3·39

Equal triangles that are on the same base	Τὰ ἴσα τρίγωνα τὰ ἐπὶ τῆς αὐτῆς βάσεως ὄντα	Eşit üçgenler; aynı tabanda

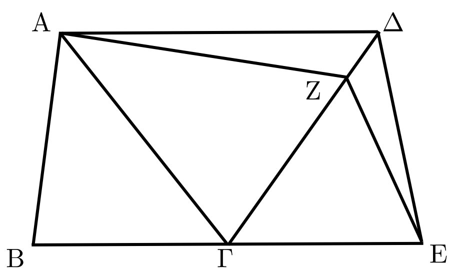
and in the same parts are also in the same parallels.	καὶ ἐπὶ τὰ αὐτὰ μέρη καὶ ἐν ταῖς αὐταῖς παραλλήλοις ἐστίν.	ve onun aynı tarafında olan, aynı paralellerdedirler de.
Let there be equal triangles ΑΒΓ and ΔΒΓ, being on the same base and on the same side of ΒΓ.	Ἔστω ἴσα τρίγωνα τὰ ΑΒΓ, ΔΒΓ ἐπὶ τῆς αὐτῆς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



3.40

Equal triangles that are on equal bases and in the same parts	Τὰ ἴσα τρίγωνα τὰ ἐπὶ ἴσων βάσεων ὄντα καὶ ἐπὶ τὰ αὐτὰ μέρη	Eşit üçgenler, eşit tabanlarda ve aynı tarafta olan,

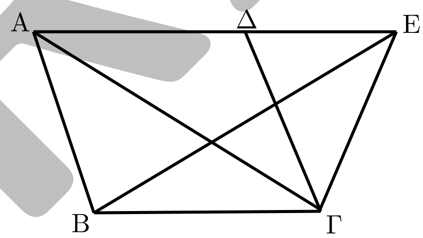
are also in the same parallels.	καὶ ἐν ταῖς αὐταῖς παραλλήλοις ἐστίν.	aynı paralelerdedirler de.
Let there be	Ἔστω	Verilmiş olsun
equal triangles ΑΒΓ and ΓΔΕ,	ἴσα τρίγωνα τὰ ΑΒΓ, ΓΔΕ	eşit ΑΒΓ ve ΓΔΕ üçgenleri,
on equal bases ΒΓ and ΓΕ,	ἐπὶ ἴσων βάσεων τῶν ΒΓ, ΓΕ	eşit ΒΓ ve ΓΕ tabanlarında,
and in the 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 değildid ;
therefore ΑΔ to ΒΕ is parallel.	ἡ ΑΔ ἄρα τῇ ΒΕ ἐστι παράλληλος.	dolayısıyla ΑΔ, ΒΕ doğrusuna paaraleldir.
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.



3.41

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



3.42

To the given triangle equal,	Τῷ δοθέντι τριγώνῳ ἴσον	Verilen bir üçgene eşit,
a parallelogram to construct	παραλληλόγραμμον συστήσασθαι	bir paralelkenarı
in the given rectilineal angle.	ἐν τῇ δοθείσῃ γωνίᾳ εὐθυγράμμῳ.	verilen bir düzkenar açıda inşa etmek.
Let be	Ἔστω	Verilen
the given triangle ΑΒΓ,	τὸ μὲν δοθὲν τρίγωνον τὸ ΑΒΓ,	üçgen ΑΒΓ,
and the given rectilineal angle, Δ.	ἡ δὲ δοθεῖσα γωνία εὐθύγραμμος ἡ Δ·	ve verilen düzkenar açı Δ olsun.
It is necessary then	δεῖ δὴ	Şimdi gerklidir
to the triangle ΑΒΓ equal	τῷ ΑΒΓ τριγώνῳ ἴσον	ΑΒΓ üçgenine eşit
a parallelogram to construct	παραλληλόγραμμον συστήσασθαι	bir paralelkenarın
in the rectilineal angle Δ.	ἐν τῇ Δ γωνίᾳ εὐθυγράμμῳ.	Δ düzkenar açısına inşa edilmesi.
Suppose ΒΓ has been cut in two at Ε,	Τετμήσθω ἡ ΒΓ δίχα κατὰ τὸ Ε,	Varsayılsın ΒΓ kenarının Ε nok-

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,
suppose ΑΗ has been drawn,
and through Γ, parallel to ΕΖ,
suppose ΓΗ has been drawn;
therefore a parallelogram is ΖΕΓΗ.

καὶ ἐπεζεύχθω ἡ ΑΕ,
καὶ συνεστάτω
πρὸς τῇ ΕΓ εὐθείᾳ
καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ Ε
τῇ Δ γωνίᾳ ἴση
ἡ ὑπὸ ΓΕΖ,
καὶ διὰ μὲν τοῦ Α τῇ ΕΓ παράλληλος
ἤχθω ἡ ΑΗ,
διὰ δὲ τοῦ Γ τῇ ΕΖ παράλληλος
ἤχθω ἡ ΓΗ·
παραλληλόγραμμον ἄρα ἐστὶ τὸ ΖΕΓΗ.

tasında ikiye kesildiği
ve ΑΕ doğrusunun birleştirildiği,
ve inşa edildiği
ΕΓ doğrusunda,
ve üzerindekiΕ noktasında,
Δ açısına eşit,
ΓΕΖ açısının,
ayrıca, Α noktasından, ΕΓ doğrusuna paralel,
ΑΗ doğrusunun çizilmiş olduğu varsayılsın,
ve Γ noktasından, ΕΖ doğrusuna paralel,
ΓΗ doğrusunun çizilmiş olduğu varsayılsın;
dolayısıyla ΖΕΓΗ bir paralelkenardır.

And since equal is ΒΕ to ΕΓ,
equal is also
triangle ΑΒΕ to triangle ΑΕΓ;
for they are on equal bases,
ΒΕ and ΕΓ,
and in the same parallels,
ΒΓ and ΑΗ;
double therefore is
triangle ΑΒΓ of triangle ΑΕΓ.
also is
parallelogram ΖΕΓΗ
double of triangle ΑΕΓ;
for it has the same base as it,
and
is in the same parallels as it;
therefore is equal
the parallelogram ΖΕΓΗ
to the triangle ΑΒΓ.
And it has angle ΓΕΖ
equal to the given Δ.

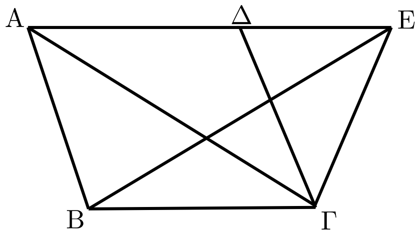
καὶ ἐπεὶ ἴση ἐστὶν ἡ ΒΕ τῇ ΕΓ,
ἴσον ἐστὶ καὶ
τὸ ΑΒΕ τρίγωνον τῷ ΑΕΓ τριγώνῳ·
ἐπί τε γὰρ ἴσων βάσεών εἰσι
τῶν ΒΕ, ΕΓ
καὶ ἐν ταῖς αὐταῖς παραλλήλοις
ταῖς ΒΓ, ΑΗ·
διπλάσιον ἄρα ἐστὶ
τὸ ΑΒΓ τρίγωνον τοῦ ΑΕΓ τριγώνου.
ἔστι δὲ καὶ
τὸ ΖΕΓΗ παραλληλόγραμμον
διπλάσιον τοῦ ΑΕΓ τριγώνου·
βάσιν τε γὰρ αὐτῷ τὴν αὐτὴν ἔχει
καὶ
ἐν ταῖς αὐταῖς ἐστιν αὐτῷ παραλλήλοις·
ἴσον ἄρα ἐστὶ
τὸ ΖΕΓΗ παραλληλόγραμμον
τῷ ΑΒΓ τριγώνῳ.
καὶ ἔχει τὴν ὑπὸ ΓΕΖ γωνίαν
ἴσην τῇ δοθείσῃ τῇ Δ.

Ve eşit olduğundan ΒΕ, ΕΓ doğrusuna,
eşittir
ΑΒΕ üçgeni de ΑΕΓ üçgenine;
tabanları
ΒΕ ve ΕΓ eşit,
ve aynı
ΒΓ ve ΑΗ paralelerinde oldukları için;
iki katıdır dolayısıyla
ΑΒΓ üçgeni ΑΕΓ üçgeninin,
ayrıca
ΖΕΓΗ paralelkenarı
iki katıdır ΑΕΓ üçgeninin;
onunla aynı tabanı olduğu,
ve
onunla aynı paralellerde olduğu için;
dolayısıyla eşittir
ΖΕΓΗ paralelkenarı
ΑΒΓ üçgenine.
Ve onun ΓΕΖ açısı
eşittir verilen Δ açısına.

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

Τῷ ἄρα δοθέντι τριγώνῳ τῷ ΑΒΓ
ἴσον
παραλληλόγραμμον συνέσταται
τὸ ΖΕΓΗ
ἐν γωνίᾳ τῇ ὑπὸ ΓΕΖ,
ἥτις ἐστὶν ἴση τῇ Δ·
ὅπερ ἔδει ποιῆσαι.

Dolayısıyla, verilen ΑΒΓ üçgenine
eşit,
bir paralelkenar,
ΖΕΓΗ, inşa edilmiş oldu
ΓΕΖ aşısında,
Δ aşısına eşit olan;
— yapılması gereken tam buydu.



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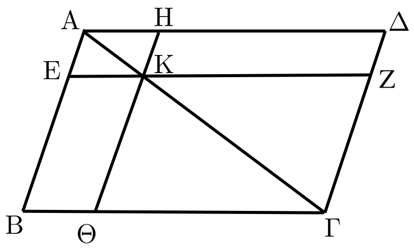
Of any parallelogram,
of the parallelograms about the diameter,
the complements

Παντὸς παραλληλογράμμου
τῶν περὶ τὴν διάμετρον παραλληλογράμμων
τὰ παραπληρώματα

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

are equal to one another.	ἴσα ἀλλήλοις ἐστίν.	
Let there be	Ἔστω	Verilmiş olsun
a parallelogram ΑΒΓΔ,	παραλληλόγραμμον τὸ ΑΒΓΔ,	bir ΑΒΓΔ paralelkenarı,
and its diameter, ΑΓ,	διάμετρος δὲ αὐτοῦ ἡ ΑΓ,	ve onun ΑΓ köşegeni,
and about ΑΓ	περὶ δὲ τὴν ΑΓ	ve ΑΓ etrafında
let be parallelograms,	παραλληλόγραμμα μὲν ἔστω	paralelkenarlar,
ΕΘ and ΖΗ,[1]	τὰ ΕΘ, ΖΗ,	ΕΘ ve ΖΗ,
and the so-called[2] complements,	τὰ δὲ λεγόμενα παραπληρώματα	ve bunların tümleyenleri,
ΒΚ and ΚΔ.	τὰ ΒΚ, ΚΔ·	ΒΚ ile ΚΔ.
I say that	λέγω, ὅτι	İddia ediyorum
equal is the complement ΒΚ	ἴσον ἐστὶ τὸ ΒΚ παραπλήρωμα	eşittir ΒΚ tümleyeni
to the complement ΚΔ.	τῷ ΚΔ παραπληρώματι.	ΚΔ tümleyenine.
For, since a parallelogram is	Ἐπεὶ γὰρ παραλληλόγραμμόν ἐστι	Çünkü, bir paralelkenar olduğundan
ΑΒΓΔ,	τὸ ΑΒΓΔ,	ΑΒΓΔ,
and its diameter, ΑΓ,	διάμετρος δὲ αὐτοῦ ἡ ΑΓ,	ve grAG, onun köşegeni,
equal is	ἴσον ἐστὶ	eşittir
triangle ΑΒΓ to triangle ΑΓΔ.	τὸ ΑΒΓ τρίγωνον τῷ ΑΓΔ τριγώνῳ.	ΑΒΓ üçgeni ΑΓΔ üçgenine.
Moreover, since a parallelogram is	πάλιν, ἐπεὶ παραλληλόγραμμόν ἐστι	Dahası, bir paralelkenar olduğundan
ΕΘ,	τὸ ΕΘ,	ΕΘ,
and its diameter, ΑΚ,	διάμετρος δὲ αὐτοῦ ἐστιν ἡ ΑΚ,	ΑΚ,onun köşegeni,
equal is	ἴσον ἐστὶ	eşittir
triangle ΑΕΚ to triangle ΑΘΚ.	τὸ ΑΕΚ τρίγωνον τῷ ΑΘΚ τριγώνῳ.	ΑΕΚ üçgeni ΑΘΚüçgenine.
Then for the same [reasons] also	διὰ τὰ αὐτὰ δὴ καὶ	Şimdifor aynı nedenle
triangle ΚΖΓ to ΚΗΓ is equal.	τὸ ΚΖΓ τρίγωνον τῷ ΚΗΓ ἐστιν ἴσον.	ΚΖΓ eşittir ΚΗΓ üçgenine.
Since then triangle ΑΕΚ	ἐπεὶ οὖν τὸ μὲν ΑΕΚ τρίγωνον	O zaman ΑΕΚ
is equal to triangle ΑΘΚ,	τῷ ΑΘΚ τριγώνῳ ἐστὶν ἴσον,	eşit olduğundan ΑΘΚ üçgenine,
and ΚΖΓ to ΚΗΓ,	τὸ δὲ ΚΖΓ τῷ ΚΗΓ,	ve ΚΖΓ, ΚΗΓ üçgenine,
triangle ΑΕΚ with ΚΗΓ	τὸ ΑΕΚ τρίγωνον μετὰ τοῦ ΚΗΓ	ΑΕΚ ile ΚΗΓ üçgenleri
is equal	ἴσον ἐστὶ	eşittirl
to triangle ΑΘΚ with ΚΖΓ;	τῷ ΑΘΚ τριγώνῳ μετὰ τοῦ ΚΖΓ·	ΑΘΚ ile ΚΖΓ üçgenlerine;
also is triangle ΑΒΓ, as a whole,	ἔστι δὲ καὶ ὅλον τὸ ΑΒΓ τρίγωνον	ayrıca ΑΒΓ üçgeninin tümü
equal to ΑΔΓ, as a whole;	ὅλῳ τῷ ΑΔΓ ἴσον·	eşittir ΑΔΓ üçgeninin tümüne;
therefore the complement ΒΚ remaining	λοιπὸν ἄρα τὸ ΒΚ παραπλήρωμα	dolayısıyla geriye kalan ΒΚ tümleyeni,
	λοιπῷ τῷ ΚΔ παραπληρώματί	geriye kalan ΚΔ tümleyenine
to the complement ΚΔ remaining	ἐστιν ἴσον.	eşittir.
is equal.		
Therefore, of any parallelogram area,	Παντὸς ἄρα παραλληλογράμμου χωρίου	Dolayısıyla, herhangi bir paralelkenarın,
of the about-the-diameter	τῶν περὶ τὴν διάμετρον	
parallelograms,	παραλληλογράμμων	köşegeni etrafındaki paralelkenarların,
the complements	τὰ παραπληρώματα	tümleyenleri
are equal to one another;	ἴσα ἀλλήλοις ἐστίν·	eşittir birbirlerine;
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	— gösterilmesi gereken tam buydu.



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[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.

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,
and the given triangle, Γ,
and the given rectilineal angle, Δ.

Ἔστω
ἡ μὲν δοθεῖσα εὐθεῖα ἡ AB,
τὸ δὲ δοθὲν τρίγωνον τὸ Γ,
ἡ δὲ δοθεῖσα γωνία εὐθύγραμμος ἡ Δ·

Verilen doğru AB,
ve verilen üçgen Γ,
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 AB
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 BEZH
ἐν γωνίᾳ τῇ ὑπὸ EBH,
ἥ ἐστιν ἴση τῇ Δ·
καὶ κείσθω
ὥστε ἐπ᾽ εὐθείας εἶναι τὴν BE
τῇ AB,
καὶ διήχθω
ἡ ZH ἐπὶ τὸ Θ,
καὶ διὰ τοῦ A
ὁποτέρᾳ τῶν BH, EZ
παράλληλος ἤχθω ἡ AΘ,
καὶ ἐπεζεύχθω ἡ ΘB.

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 AΘ, EZ
εὐθεῖα ἐνέπεσεν ἡ ΘZ,
αἱ ἄρα ὑπὸ AΘZ, ΘZE γωνίαι
δυσὶν ὀρθαῖς εἰσιν ἴσαι.
αἱ ἄρα ὑπὸ BΘH, HZE
δύο ὀρθῶν ἐλάσσονές εἰσιν·
αἱ δὲ ἀπὸ ἐλασσόνων ἢ δύο ὀρθῶν εἰς ἄπειρον ἐκβαλλόμεναι
συμπίπτουσιν·
αἱ ΘB, ZE 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 K,
καὶ διὰ τοῦ K σημείου
ὁποτέρᾳ τῶν EA, ZΘ παράλληλος
ἤχθω ἡ KΛ,
καὶ ἐκβεβλήσθωσαν αἱ ΘA, HB
ἐπὶ τὰ Λ, M 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;

παραλληλόγραμμον ἄρα ἐστὶ τὸ ΘΛKZ,
διάμετρος δὲ αὐτοῦ ἡ ΘK,
περὶ δὲ τὴν ΘK
παραλληλόγραμμα μὲν τὰ AH, ME,
τὰ δὲ λεγόμενα παραπληρώματα
τὰ ΛB, BZ·

Bir paralelkenardır dolayısıyla ΘΛKZ,
ve onun kçşegeni ΘK,
ve ΘK etrafındadır
AH ve ME paralelkenarları,
ve bunların tümleyenleris,
ΛB ileBZ;

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
is equal.

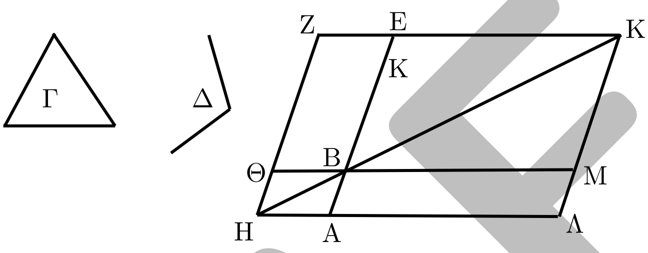
ἴσον ἄρα ἐστὶ τὸ ΛΒ τῷ ΒΖ.
ἀλλὰ τὸ ΒΖ τῷ Γ τριγώνῳ ἐστὶν ἴσον·
καὶ τὸ ΛΒ ἄρα τῷ Γ ἐστιν ἴσον.
καὶ ἐπεὶ ἴση ἐστὶν
ἡ ὑπὸ ΗΒΕ γωνία τῇ ὑπὸ ΑΒΜ,
ἀλλὰ ἡ ὑπὸ ΗΒΕ τῇ Δ ἐστιν ἴση,
καὶ ἡ ὑπὸ ΑΒΜ ἄρα τῇ Δ γωνίᾳ
ἐστὶν ἴση.

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,
dolayısıyla ABM de Δ açısına eşittir.

Therefore, along the given STRAIGHT, AB,
equal to the given triangle, Γ,
a parallelogram has been applied,
ΛB,
in the angle ABM,
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,
AB doğrusu boyunca,
verilen bir Γ üçgenine eşit,
bir,
ΛB paralelkenarı yerleştirilmiş oldu,
ABM aşısında,
eşit olan Δ açısına;
— yapılması gereken tam buydu.



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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] eşitl
bir paralelkenar inşa etmek,
verilen düzkenar açıda.

Let be
the given rectilineal [figure] ABΓΔ,
and the given rectilineal angle, E.

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

Verilmiş olsun
ABΓΔ düzkenar [figürü],
ve düzkenar E açısı.

It is necessary then
to the rectilineal ABΓΔ equal
a parallelogram to construct
in the given angle E.

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

Gereklidir şimdi
ABΓΔ düzkenarına eşit
bir paralelkenar inşa etmek,
verilen E açısında.

Suppose has been joined ΔB,
and suppose has been constructed,
equal to the triangle ABΔ,
a parallelogram, ZΘ,
in the angle ΘKZ,
which is equal to E;
and suppose there has been applied
along the STRAIGHT HΘ,
equal to triangle ΔBΓ,
a parallelogram, HM,
in the angle HΘM,
which is equal to E.

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.

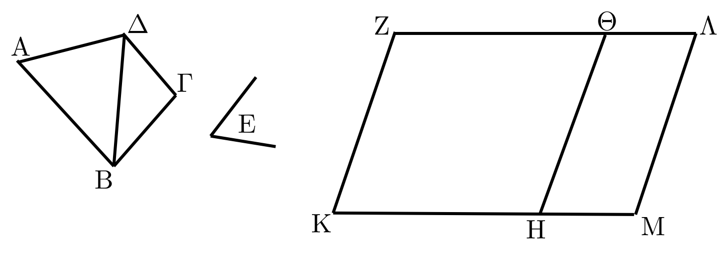
Birleştirilmiş olduğu ΔB doğrusunun,
ve inşa edilmiş olsun,
ABΔ üçgenine eşit,
bir ZΘ paralelkenarı,
ΘKZ açısında,
eşit olan E açısına;
ve yerleştirilmiş olsun
HΘ doğrusu boyunca ,
ΔBΓ üçgenine eşit,
bir HM paralelkenarı,
HΘM açısında,
eşit olan E açısına.

And since angle E
to either of ΘKZ and HΘM
is equal,
therefore also ΘKZ to HΘM
is equal.
Let KΘH be added in common;

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·

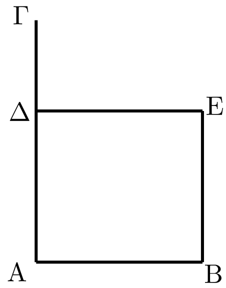
Ve E açısı
ΘKZ ve HΘM açılarının her birine
eşit olduğundan,
ΘKZ da HΘM açısına
eşittir.
Eklenmiş olsun KΘH ortak olarak;

therefore ΖΚΘ and ΚΘΗ	αἱ ἄρα ὑπὸ ΖΚΘ, ΚΘΗ	dolayısıyla ΖΚΘ ve ΚΘΗ,
to ΚΘΗ and ΗΘΜ	ταῖς ὑπὸ ΚΘΗ, ΗΘΜ	ΚΘΗ ve ΗΘΜ açılarına
are equal.	ἴσαι εἰσίν.	eşittirler.
But ΖΚΘ and ΚΘΗ	ἀλλ᾽ αἱ ὑπὸ ΖΚΘ, ΚΘΗ	Fakat ΖΚΘ ve ΚΘΗ
are equal to two RIGHTs;	δυσὶν ὀρθαῖς ἴσαι εἰσίν·	eşittirler iki dik açıya;
therefore also ΚΘΗ and ΗΘΜ	καὶ αἱ ὑπὸ ΚΘΗ, ΗΘΜ ἄρα	dolayısıyla ΚΘΗ ve ΗΘΜ açılarıda
are equal to two RIGHTs.	δύο ὀρθαῖς ἴσαι εἰσίν.	eşittirler iki dik açıya.
Then to some STRAIGHT, ΗΘ,	πρὸς δή τινι εὐθεῖᾳ τῇ ΗΘ	Şimdi bir ΗΘ doğrusuna,
and at the same point, Θ,	καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ Θ	ve aynı Θ noktasında,
two STRAIGHTs, ΚΘ and ΘΜ,	δύο εὐθεῖαι αἱ ΚΘ, ΘΜ	iki ΚΘ ve ΘΜ doğruları,
not lying in the same parts,	μὴ ἐπὶ τὰ αὐτὰ μέρη κείμεναι	aynı tarafta kalmayan,
the adjacent angles	τὰς ἐφεξῆς γωνίας	komşu açıları
make equal to two RIGHTs.	δύο ὀρθαῖς ἴσας ποιοῦσιν·	iki dik açıya eşit yapar.
In a STRAIGHT then are ΚΘ and ΘΜ;	ἐπ᾽ εὐθείας ἄρα ἐστὶν ἡ ΚΘ τῇ ΘΜ·	O zaman bir doğrudadır ΚΘ ve ΘΜ;
and since on the parallels ΚΜ and ΖΗ	καὶ ἐπεὶ εἰς παραλλήλους τὰς ΚΜ, ΖΗ	ve ΚΜ ve ΖΗ paralelleri üzerine
fell the STRAIGHT ΘΗ,	εὐθεῖα ἐνέπεσεν ἡ ΘΗ,	düştüğünden ΘΗ doğrusu,
the alternate angles ΜΘΗ and ΘΗΖ	αἱ ἐναλλὰξ γωνίαι αἱ ὑπὸ ΜΘΗ, ΘΗΖ ἴσαι	ters ΜΘΗ ve ΘΗΖ açıları
are equal to one another.	ἀλλήλαις εἰσίν.	eşittir birbirine.
Let ΘΗΛ be added in common;	κοινὴ προσκείσθω ἡ ὑπὸ ΘΗΛ·	eklenmiş olsun ΘΗΛ ortak olarak;
therefore ΜΘΗ and ΘΗΛ	αἱ ἄρα ὑπὸ ΜΘΗ, ΘΗΛ ταῖς ὑπὸ ΘΗΖ, ΘΗΛ	dolayısıyla ΜΘΗ ve ΘΗΛ,
to ΘΗΖ and ΘΗΛ	ίσαι εἰσιν.	ΘΗΖ ve ΘΗΛ açılarına
are equal.		eşittirler.
But ΜΘΗ and ΘΗΛ	αλλ᾽ αἱ ὑπὸ ΜΘΗ, ΘΗΛ	Fakat ΜΘΗ ve ΘΗΛ
are equal to two RIGHTs;	δύο ὀρθαῖς ἴσαι εἰσίν·	eşittirler iki dik açıya;
therefore also ΘΗΖ and ΘΗΛ	καὶ αἱ ὑπὸ ΘΗΖ, ΘΗΛ ἄρα	dolayısıyla ΘΗΖ ve ΘΗΛ da
are equal to two RIGHTs;	δύο ὀρθαῖς ἴσαι εἰσίν·	eşittirler iki dik açıya;
therefore on a STRAIGHT are ΖΗ and ΗΛ.	ἐπ᾽ εὐθείας ἄρα ἐστὶν ἡ ΖΗ τῇ ΗΛ.	dolaysısyla bir doğru üzerindedir ΖΗ ve ΗΛ.
And since ΖΚ to ΘΗ	καὶ ἐπεὶ ἡ ΖΚ τῇ ΘΗ	Ve olduğundan ΖΚ, ΘΗ doğrusuna
is equal and parallel,	ἴση τε καὶ παράλληλός ἐστιν,	eşit ve paralel,
but also ΘΗ to ΜΛ,	ἀλλὰ καὶ ἡ ΘΗ τῇ ΜΛ,	ve de ΘΗ, ΜΛ doğrusuna,
therefore also ΚΖ to ΜΛ	καὶ ἡ ΚΖ ἄρα τῇ ΜΛ	dolayısıyla ΚΖ da ΜΛ doğrusuna
is equal and parallel;	ἴση τε καὶ παράλληλός ἐστιν·	eşit ve paraleldir;
and join them	καὶ ἐπιζευγνύουσιν αὐτὰς εὐθεῖαι αἱ ΚΜ, ΖΛ·	ve birleştirir onları ΚΜ ile ΖΛ, ki bunlarda doğrulardır;
ΚΜ and ΖΛ, which are STRAIGHTs;		
therefore also ΚΜ and ΖΛ	καὶ αἱ ΚΜ, ΖΛ ἄρα	dolayısıyla ΚΜ ve ΖΛ da
are equal and parallel;	ἴσαι τε καὶ παράλληλοί εἰσιν·	eşit ve paraleldirler;
a parallelogram therefore is ΚΖΛΜ.	παραλληλόγραμμον ἄρα ἐστὶ τὸ ΚΖΛΜ.	dolayısıyla ΚΖΛΜ bir paralelkenardır.
And since equal is	καὶ ἐπεὶ ἴσον ἐστὶ	Ve eşit olduğundan
triangle ΑΒΔ	τὸ μὲν ΑΒΔ τρίγωνον τῷ ΖΘ παραλληλογράμμῳ,	ΑΒΔ üçgeni
to the parallelogram ΖΘ,		ΖΘ paralelkenarına,
and ΔΒΓ to ΗΜ,	τὸ δὲ ΔΒΓ τῷ ΗΜ,	ve ΔΒΓ, ΗΜ paralelkenarına,
therefore, as a whole,	ὅλον ἄρα τὸ ΑΒΓΔ εὐθύγραμμον	dolayısısyla, bir bütün olarak,
the rectilineal ΑΒΓΔ	ὅλῳ τῷ ΚΖΛΜ παραλληλογράμμῳ	ΑΒΓΔ düzkenarı
to parallelogram ΚΖΛΜ as a whole	ἐστὶν ἴσον.	bir bütün olarak ΚΖΛΜ paralelkenarına
is equal.		eşittir.
Therefore, to the given rectilineal [figure], ΑΒΓΔ, equal,	Τῷ ἄρα δοθέντι εὐθυγράμμῳ τῷ ΑΒΓΔ ἴσον	Dolayısıyla, verilen düzkenar ΑΒΓΔ figürüne eşit,
a parallelogram has been constructed, ΚΖΛΜ,	παραλληλόγραμμον συνέσταται τὸ ΚΖΛΜ	bir ΚΖΛΜ paralelkenarı inşa edilmiş oldu,
in the angle ΖΚΜ,	ἐν γωνίᾳ τῇ ὑπὸ ΖΚΜ,	ΖΚΜ açısında,
which is equal to the given Ε;	ἥ ἐστιν ἴση τῇ δοθείσῃ τῇ Ε·	eşit olan verilmiş Ε açısına;
—just what it was necessary to do.	ὅπερ ἔδει ποιῆσαι.	— yapılması gereken tam buydu.



3.46

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.



3·47

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.
	διὰ τὰ αὐτὰ δὴ	Sonra aynı nedenle
Then for the same [reason]	καὶ ἡ ΒΑ τῇ ΑΘ ἐστιν ἐπ᾽ εὐθείας.	ΒΑ ile ΑΘ da bir doğrudadır.
also ΒΑ with ΑΘ is on a straight.	καὶ ἐπεὶ ἴση ἐστὶν	Ve eşit olduğundan
And since equal is	ἡ ὑπὸ ΔΒΓ γωνία τῇ ὑπὸ ΖΒΑ·	ΔΒΓ, ΖΒΑ açısına;
angle ΔΒΓ to angle ΖΒΑ;	ὀρθὴ γὰρ ἑκατέρα·	her ikiside diktir;
for either is right;	κοινὴ προσκείσθω ἡ ὑπὸ ΑΒΓ·	eklenmiş olsun ΑΒΓ her ikisine de;
let ΑΒΓ be added in common;	ὅλη ἄρα ἡ ὑπὸ ΔΒΑ	dolayısıyla ΔΒΑ açısının tamamı
therefore ΔΒΑ as a whole	ὅλῃ τῇ ὑπὸ ΖΒΓ	ΖΒΓ açısının tamamına
to ΖΒΓ as a whole	ἐστιν ἴση.	eşittir.
is equal.	καὶ ἐπεὶ ἴση ἐστὶν	Ve eşit olduğundan
And since equal is	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 ΑΒΛ
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.

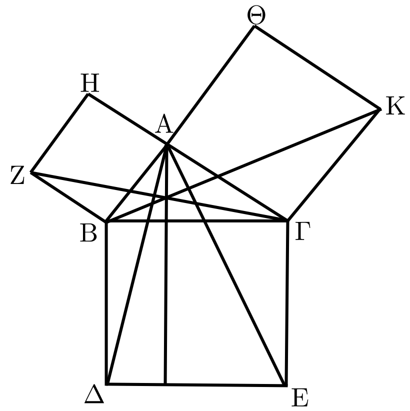
ἡ δὲ ΖΒ τῇ ΒΑ,
δύο δὴ αἱ ΔΒ, ΒΑ
δύο ταῖς ΖΒ, ΒΓ
ἴσαι εἰσὶν
ἑκατέρα ἑκατέρᾳ·
καὶ γωνία ἡ ὑπὸ ΔΒΑ
γωνίᾳ τῇ ὑπὸ ΖΒΓ
ἴση·
βάσις ἄρα ἡ ΑΔ
βάσει τῇ ΖΓ
[ἐστιν] ἴση,
καὶ τὸ ΑΒΔ τρίγωνον
τῷ ΖΒΓ τριγώνῳ
ἐστὶν ἴσον·
καί [ἐστι] τοῦ μὲν ΑΒΔ τριγώνου
διπλάσιον τὸ ΒΛ παραλληλόγραμμον·
βάσιν τε γὰρ τὴν αὐτὴν ἔχουσι 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 ΑΒΛ 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.

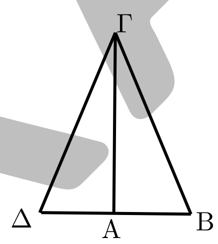
[2]Fitzpatrick considers this ordering of the two straight lines to be ‘obviously a mistake’. But if it is a mistake, how could it have been made?



3.48

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

to that on ΒΓ;	τὸ ἀπὸ τῆς ΒΓ·	are equal
for it is supposed;	ὑπόκειται γάρ·	ΒΓ üzerlerindekine;
therefore the square on ΔΓ	τὸ ἄρα ἀπὸ τῆς ΔΓ τετράγωνον	çünkü varsayıldı;
is equal	ἴσον ἐστὶ	dolayısıyla ΔΓ üzerlerindeki
to the square on ΒΓ;	τῷ ἀπὸ τῆς ΒΓ τετραγώνῳ·	eşittir
so that the side ΔΓ	ὥστε καὶ πλευρὰ	ΒΓ üzerlerindeki kareye;
to the side ΒΓ	ἡ ΔΓ τῇ ΒΓ	böylece ΔΓ kenarı
is equal;	ἐστιν ἴση·	ΒΓ kenarına
and since equal is ΔΑ to ΑΒ,	καὶ ἐπεὶ ἴση ἐστὶν ἡ ΔΑ τῇ ΑΒ,	eşittir;
and common [is] ΑΓ,	κοινὴ δὲ ἡ ΑΓ,	ve ΔΑ, ΑΒ kenarına eşit olduğundan,
the two ΔΑ and ΑΓ	δύο δὴ αἱ ΔΑ, ΑΓ	ve ΑΓ ortak,
to the two ΒΑ and ΑΓ	δύο ταῖς ΒΑ, ΑΓ	ΔΑ ve ΑΓ ikilisi
are equal;	ἴσαι εἰσίν·	ΒΑ ve ΑΓ ikilisine
and the base ΔΑ	καὶ βάσις ἡ ΔΓ	eşittirler;
to the base ΒΓ	βάσει τῇ ΒΓ	ve ΔΑ tabanı
[is] equal;	ἴση·	ΒΓ tabanına
therefore the angle ΔΑΓ	γωνία ἄρα ἡ ὑπὸ ΔΑΓ	eşittir;
to the angle ΒΑΓ	γωνίᾳ τῇ ὑπὸ ΒΑΓ	dolayısıyla ΔΑΓ açısı
[is] equal.	[ἐστιν] ἴση.	ΒΑΓ açısına
And right [is] ΔΑΓ;	ὀρθὴ δὲ ἡ ὑπὸ ΔΑΓ·	eşittir.
right therefore [is] ΒΑΓ.	ὀρθὴ ἄρα καὶ ἡ ὑπὸ ΒΑΓ.	Ve ΔΑΓ diktir;
		diktir dolayısıyla ΒΑΓ.
If, therefore, of a triangle,	Ἐὰν ἀρὰ τριγώνου	Eğer dolayısıyla bir üçgende
the square on one of the sides	τὸ ἀπὸ μιᾶς τῶν πλευρῶν τετράγωνον	bir kenarın üzerindeki kare
be equal	ἴσον ᾖ	eşitse
to the squares on the remaining two sides,	τοῖς ἀπὸ τῶν λοιπῶν τοῦ τριγώνου δύο πλευρῶν τετραγώνοις,	üçgenin geriye kalan kenarlarındaki karelere,
the angle contained	ἡ περιεχομένη γωνία	üçgenin geriye kalan kenarlarınca içerilen
by the remaining two sides of the triangle	ὑπὸ τῶν λοιπῶν τοῦ τριγώνου δύο πλευρῶν	açı
is right;	ὀρθή ἐστιν·	diktir;
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	— gösterilmesi gereken tam buydu.



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