Book I of the Elements ΣΤΟΙΧΕΙΩΝ Α Öğelerin Birinci Kitabı

Euclid ΕΥΚΛΕΙΔΟΣ Öklid

September 29, 2016
Recovered from TEX files with pdf version dated May 30, 2012
Edited to agree with the version of September 27, 2011

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Chapter 1

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/`

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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 δὴ. 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].

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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 (ἁ): 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.*

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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	γραμμής	γωνίας	κύκλου	τριγώνου	μέρους
	dative	γραμμῇ	γωνίᾳ	κύκλῳ	τριγώνῳ	μέρει
	accusative	γραμμήν	γωνίαν	κύκλον	τρίγωνον	μέρος
plural	nominative	γραμμαί	γωνίαι	κύκλοι	τρίγωνα	μέρη
	genitive	γραμμών	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 A σημεῖον 'the A point' or ἡ AB 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 A 'the A' or ἡ AB '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 γραμμὴς 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].

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	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 ΑΒ, ΒΓ ευθείων γραμμῶν γωνία 'the bounded-by-the-AB-BΓ-straight-lines angle'.[13] In the same proposition, the form γωνία ἡ ὑπὸ ΑΒΓ appears (actually γωνία ἡ ὑπὸ ΒΖΓ), with no obvious distinction in meaning. (Each position of [ἡ] ὑπὸ ΑΒΓ is called attributive by Smyth.) For short, Euclid may say just ἡ ὑπὸ ΑΒΓ for the angle, without using γωνία.

The nesting of adjectives between article and noun can be repeated. An extreme example is the phrase from the enunciation of Proposition 47 analyzed in Table 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 ΑΒ τῇ ΔΕ '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 ΑΕΚ τρίγωνον μετὰ τοῦ ΚΗΓ ἴσον ἐστὶ τῷ ΑΘΚ τριγώνῳ μετὰ τοῦ ΚΖΓ '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.

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τὸ ἀπὸ τῆς τὴν ὀρθὴν γωνίαν ὑποτεινούσης πλευρᾶς τετράγωνον	the square on the side subtending the right angle
ἀπὸ τῆς τὴν ὀρθὴν γωνίαν ὑποτεινούσης πλευρᾶς	on the side subtending the right angle
τὴν ὀρθὴν γωνίαν	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 ἀρχῆς '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 ἴσου: '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.

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	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).

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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].

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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

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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.

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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.

DRAFT

	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.

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[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.

DRAFT

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.

DRAFT

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 ΓA and ΓB.	Κέντρῳ μὲν τῷ A διαστήματι δὲ τῷ AB κύκλος γεγράφθω ὁ ΒΓΔ, καὶ πάλιν κέντρῳ μὲν τῷ B διαστήματι δὲ τῷ BA κύκλος γεγράφθω ὁ ΑΓΕ, καὶ ἀπὸ τοῦ Γ σημείου, καθ᾽ ὃ τέμνουσιν ἀλλήλους οἱ κύκλοι, ἐπί τὰ A, B σημεῖα ἐπεζεύχθωσαν εὐθεῖαι αἱ ΓA, ΓB.	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 ΓA, ΓB doğruları birleştirilmiş olsun.
And since the point A is the center of the circle ΓΔB, equal is AΓ to AB; moreover, since the point B is the center of the circle ΓΑΕ, equal is BΓ to BA.	Καὶ ἐπεὶ τὸ A σημεῖον κέντρον ἐστὶ τοῦ ΓΔB κύκλου, ἴση ἐστὶν ἡ AΓ τῇ AB· πάλιν, ἐπεὶ τὸ B σημεῖον κέντρον ἐστὶ τοῦ ΓΑΕ κύκλου, ἴση ἐστὶν ἡ BΓ τῇ BA.	A noktası ΓΔB çemberinin merkezi olduğu için, AΓ, AB doğrusuna eşittir. Yine B noktası ΓΑΕ çemberinin merkezi olduğu için, BΓ, 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].

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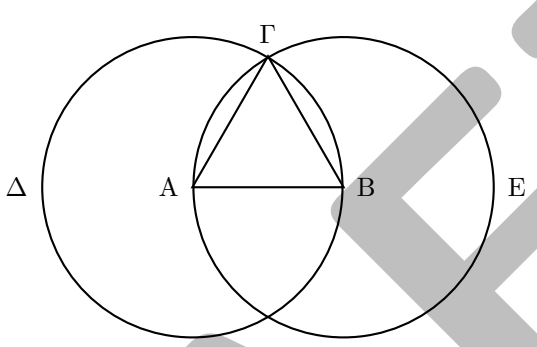
And ΓA was shown equal to AB;	ἐδείχθη δὲ καὶ ἡ ΓA τῇ AB ἴση·	Ve ΓA doğrusunun, AB doğrusuna eşit olduğu gösterilmişti.
therefore either of ΓA and ΓB to AB	ἑκατέρα ἄρα τῶν ΓA, ΓB τῇ AB	O zaman ΓA, ΓB doğrularının her biri
is equal.	ἐστιν ἴση.	AB doğrusuna eşittir.
But equals to the same	τὰ δὲ τῷ αὐτῷ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



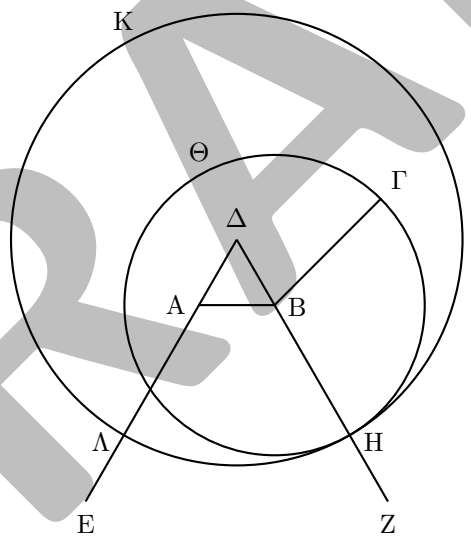
3.2

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

DRAFT

ΗΚΛ.	ὁ ΗΚΛ.	
Since then the point B is the center of ΓΗΘ,	Ἐπεὶ οὖν τὸ Β σημεῖον κέντρον ἐστὶ τοῦ ΓΗΘ,	Β noktası ΓΗΘ çemberinin merkezi olduğu için,
ΒΓ is equal to ΒΗ.	ἴση ἐστὶν ἡ ΒΓ τῇ ΒΗ.	ΒΓ, ΒΗ doğrusuna eşittir.
Moreover,	πάλιν,	Yine,
since the point Δ is the center of the circle ΚΗΛ,	ἐπεὶ τὸ Δ σημεῖον κέντρον ἐστὶ τοῦ ΗΚΛ κύκλου,	Δ noktası ΗΚΛ çemberinin merkezi olduğu için,
equal is ΔΛ to ΔΗ;	ἴση ἐστὶν ἡ ΔΛ τῇ ΔΗ,	ΔΛ, ΔΗ doğrusuna eşittir,
of these, the [part] ΔΑ to ΔΒ	ὧν ἡ ΔΑ τῇ ΔΒ	ve (birincinin) ΔΑ parçası,
is equal.	ἴση ἐστίν.	(ikincinin) ΔΒ parçasına eşittir.
Therefore the remainder ΑΛ	λοιπὴ ἄρα ἡ ΑΛ	Dolayısıyla ΑΛ kalanı,
to the remainder ΒΗ	λοιπῇ τῇ ΒΗ	ΒΗ kalanına
is equal.	ἐστιν ἴση.	eşittir.
But ΒΓ was shown equal to ΒΗ.	ἐδείχθη δὲ καὶ ἡ ΒΓ τῇ ΒΗ ἴση·	Ve ΒΓ doğrusunun, ΒΗ doğrusuna eşit olduğu gösterilmişti.
Therefore either of ΑΛ and ΒΓ to ΒΗ	ἑκατέρα ἄρα τῶν ΑΛ, ΒΓ τῇ ΒΗ	Dolayısıyla ΑΛ, ΒΓ doğrularının her
is equal.	ἐστιν ἴση.	biri ΒΗ doğrusuna eşittir.
But equals to the same	τὰ δὲ τῷ αὐτῷ ἴσα	Ama aynı şeye eşit olanlar birbirine
also are equal to one another.	καὶ ἀλλήλοις ἐστὶν ἴσα·	eşittir.
And therefore ΑΛ is equal to ΒΓ.	καὶ ἡ ΑΛ ἄρα τῇ ΒΓ ἐστιν ἴση.	Ve dolayısıyla ΑΛ da, ΒΓ doğrusuna eşittir.
Therefore at the given point A	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	AB, Γ
AB and Γ,[1]	αἱ ΑΒ, Γ,	olsunlar;
of which let the greater be AB.	ὧν μείζων ἔστω ἡ ΑΒ·	daha büyüğü AB olsun.
It is necessary then	δεῖ δὴ	Gereklidir
from the greater, AB,	ἀπὸ τῆς μείζονος τῆς ΑΒ	daha büyük olan AB 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.

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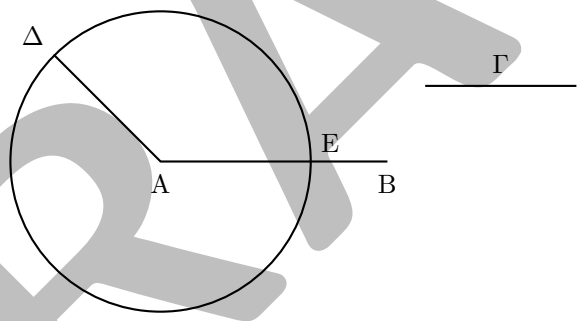
equal to the less, Γ, to take away a STRAIGHT.	τῇ ἐλάσσονι τῇ Γ ἴσην εὐθεῖαν ἀφελεῖν.	daha küçük olan Γ doğrusuna eşit olan bir doğru kesmek.
Let there be laid down at the point A, equal to the line Γ, AΔ; and to center A at distance AΔ suppose circle ΔEZ has been drawn.	Κείσθω πρὸς τῷ A σημείῳ τῇ Γ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



3·4

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

DRAFT

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

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

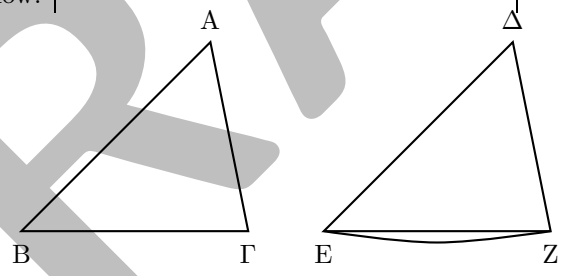
[2] That is, 'respectively'. We could translate the Greek also as 'each to each'; but the Greek ἑκατέρος has the dual number, as opposed to ἕκαστος 'each'. The English form 'either' is a remnant of the dual number.

[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*.

DRAFT

to triangle ΔEZ as a whole	ἐπὶ ὅλον τὸ ΔEZ τρίγωνον	iki doğru çevreleyecek bir alan,
will apply	ἐφαρμόσει	imkansız olan.
and will be equal to it,	καὶ ἴσον αὐτῷ ἔσται,	Bu yüzden BΓ tabanı çakışacak EZ tabanıyla
and the remaining angles	καὶ αἱ λοιπαὶ γωνίαι	ve eşit olacak ona.
to the remaining angles	ἐπὶ τὰς λοιπὰς γωνίας	Dolayısıyla ABΓ üçgeninin tamamı üstüne gelecek ΔEZ üçgeninin tamamına,
will apply,	ἐφαρμόσουσι	ve eşit olacak ona,
and be equal to them,	καὶ ἴσαι αὐταῖς ἔσονται,	ve geriye kalan açılar üstüne gelecekler geriye kalan açıların,
ABΓ to ΔEZ	ἡ μὲν ὑπὸ ABΓ τῇ ὑπὸ ΔEZ	ve eşit olacaklar onlara;
and AΓB to ΔZE.	ἡ δὲ ὑπὸ AΓB τῇ ὑπὸ ΔZE.	ABΓ, ΔEZ açısına
		ve AΓB, ΔZE açısına.
If, therefore, two triangles	Ἐὰν ἄρα δύο τρίγωνα	Dolayısıyla, eğer,
two sides	τὰς δύο πλευρὰς	iki üçgenin, varsa iki kenarı eşit olan iki kenara,
to two sides	[ταῖς] δύο πλευραῖς	her bir (kenar) birine,
have equal,	ἴσας ἔχῃ	ve varsa açıya eşit açısı,
either to either,	ἑκατέραν ἑκατέρᾳ	(yani) eşit doğrularca içerilen,
and angle to angle have equal,	καὶ τὴν γωνίαν τῇ γωνίᾳ ἴσην ἔχῃ	hem tabana eşit tabanları olacak,
—that which is by the equal STRAIGHTS	τὴν ὑπὸ τῶν ἴσων εὐθειῶν	hem üçgen eşit olacak üçgene,
contained,	περιεχομένην,	hem de geriye kalan açılar eşit olacak geriye kalan açıların,
also base to base	καὶ τὴν βάσιν τῇ βάσει	her biri birine,
they will have equal,	ἴσην ἕξει,	(yani) eşit kenarları görenler;
and the triangle to the triangle	καὶ τὸ τρίγωνον τῷ τριγώνῳ	— gösterilmesi gereken tam buydu.
will be equal,	ἴσον ἔσται,	
and the remaining angles	καὶ αἱ λοιπαὶ γωνίαι	
to the remaining angles	ταῖς λοιπαῖς γωνίαις	
will be equal,	ἴσαι ἔσονται	
either to either,	ἑκατέρα ἑκατέρᾳ,	
—those that the equal sides subtend;	ὑφ᾽ ἃς αἱ ἴσαι πλευραὶ ὑποτείνουσιν·	
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	



3·5

In[1] isosceles triangles,	Τῶν ἰσοσκελῶν τριγώνων	İkizkenar üçgenlerde,
the angles at the base	αἱ πρὸς τῇ βάσει γωνίαι	tabandaki açılar,
are equal to one another,	ἴσαι ἀλλήλαις εἰσίν,	birbirine eşittir,
and,	καὶ	ve,
the equal STRAIGHTs being extended,	προσεκβληθεισῶν τῶν ἴσων εὐθειῶν	eşit doğrular uzatıldığında,
the angles under the base	αἱ ὑπὸ τὴν βάσιν γωνίαι	tabanın altında kalan açılar,
will be equal to one another.	ἴσαι ἀλλήλαις ἔσονται.	birbirine eşit olacaklar.
Let there be	Ἔστω	Verilmiş olsun,
an isosceles triangle, ABΓ	τρίγωνον ἰσοσκελὲς τὸ ABΓ	bir ABΓ ikizkenar üçgeni;
having equal	ἴσην ἔχον	AB kenarı eşit olan AΓ kenarına,
side AB to side AΓ,	τὴν AB πλευρὰν τῇ AΓ πλευρᾷ,	ve varsayılsın BΔ ve ΓE doğrularının uzatılmış olduğu, AB ve AΓ doğrularından.
and suppose have been extended	καὶ προσεκβεβλήσθωσαν	
on a STRAIGHT with AB and AΓ	ἐπ᾽ εὐθείας ταῖς AB, AΓ	

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

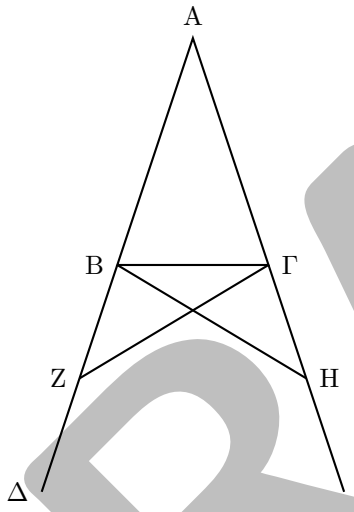
[1]More literally, 'of'.

DRAFT

the straights BΔ and ΓE.	εὐθεῖαι αἱ BΔ, ΓE·	
I say that	λέγω, ὅτι	İddia ediyorum ki
angle ABΓ to angle AΓB	ἡ μὲν ὑπὸ ABΓ γωνία τῇ ὑπὸ AΓB	ABΓ açısı, AΓB açısına,
is equal,	ἴση ἐστίν,	eşittir
and ΓBΔ to BΓE.	ἡ δὲ ὑπὸ ΓBΔ τῇ ὑπὸ BΓE.	ve ΓBΔ açısı eşittir BΓE açısına.
For, suppose there has been chosen	Εἰλήφθω γὰρ	Çünkü, kabul edelim ki, seçilmiş olsun,
a random point Z on BΔ,	ἐπὶ τῆς BΔ τυχὸν σημεῖον τὸ Z,	rastgele bir Z noktası BΔ üzerinnde,
and there has been taken away	καὶ ἀφῃρήσθω	ve AH, büyük olan AE doğrusundan
from the greater, AE,	ἀπὸ τῆς μείζονος τῆς AE	küçük olan AZ doğrusunun kesilmişi olsun,
to the less, AZ,	τῇ ἐλάσσονι τῇ AZ	ve ZΓ ile HB birleştirilmiş olsun.
an equal, AH,	ἴση ἡ AH,	
and suppose there have been joined	καὶ ἐπεζεύχθωσαν	
the straights ZΓ and HB.	αἱ ZΓ, HB εὐθεῖαι.	
Since then AZ is equal to AH,	Ἐπεὶ οὖν ἴση ἐστὶν ἡ μὲν AZ τῇ AH	Çünkü o zaman AZ eşittir AH doğrusuna,
and AB to AΓ,	ἡ δὲ AB τῇ AΓ,	ve AB doğrusu AΓ doğrusuna,
so the two AZ and AΓ	δύο δὴ αἱ ZA, AΓ	böylece AZ ve AΓ ikilisi eşit olacak
to the two HA, AB,	δυσὶ ταῖς HA, AB	HA ve AB ikilisinin,
will be equal,	ἴσαι εἰσὶν	her biri birine;
either to either;	ἑκατέρα ἑκατέρᾳ·	ve sınırlandırırlar ortak bir açıyı,
and they bound a common angle,	καὶ γωνίαν κοινὴν περιέχουσι	[yani] ZAH açısını;
[namely] ZAH;	τὴν ὑπὸ ZAH·	dolayısıyla ZΓ tabanı eşittir HB tabanına,
therefore the base ZΓ to the base HB	βάσις ἄρα ἡ ZΓ βάσει τῇ HB	ve AZΓ üçgeni eşit olacak AHB üçgenine,
is equal,	ἴση ἐστίν,	ve geriye kalan açılar eşit olacaklar geriye kalan açıların,
and triangle AZΓ to triangle AHB	καὶ τὸ AZΓ τρίγωνον τῷ AHB τριγώνῳ	her biri birine,
will be equal,	ἴσον ἔσται,	(yani) eşit kenarları görenler,
and the remaining angles	καὶ αἱ λοιπαὶ γωνίαι	AΓZ açısı ABH açısına,
to the remaining angles	ταῖς λοιπαῖς γωνίαις	ve AZΓ açısı AHB açısına.
will be equal,	ἴσαι ἔσονται	Böylece AZ bütününün eşitliği AH bütününe,
either to either,	ἑκατέρα ἑκατέρᾳ,	ve bunların AB parçasının eşitliği AΓ parçasına,
those that the equal sides subtend,	ὑφ᾽ ἃς αἱ ἴσαι πλευραὶ ὑποτείνουσιν,	gerektirir BZ kalanının eşit olmasını ΓH kalanına.
AΓZ to ABH,	ἡ μὲν ὑπὸ AΓZ τῇ ὑπὸ ABH,	Ve ZΓ doğrusunun gösterilmişti eşit olduğu HB doğrusuna.
and AZΓ to AHB.	ἡ δὲ ὑπὸ AZΓ τῇ ὑπὸ AHB.	O zaman BZ ve ZΓ ikilisi eşittir ΓHve HB ikilisinin,
And since AZ as a whole	καὶ ἐπεὶ ὅλη ἡ AZ	her biri birine,
to AH as a whole	ὅλῃ τῇ AH	ve BZΓ açısı ΓHB açısına,
is equal,	ἐστιν ἴση,	ve onların ortak tabanı BΓ doğrusudur;
of which the [part] AB to AΓ is equal,	ὧν ἡ AB τῇ AΓ ἐστιν ἴση,	ve bu yüzden BZΓ üçgeni eşit olacak ΓHB üçgenine,
therefore the remainder BZ	λοιπὴ ἄρα ἡ BZ	ve geriye kalan açılar da eşit olacaklar geriye kalan açıların,
to the remainder ΓH	λοιπῇ τῇ ΓH	her biri birine,
is equal.	ἐστιν ἴση.	aynı kenarları görenler.
And ZΓ was shown equal to HB.	ἐδείχθη δὲ καὶ ἡ ZΓ τῇ HB ἴση·	Dolayısıyla ZBΓ eşittir HΓB açısına,
Then the two BZ and ZΓ	δύο δὴ αἱ BZ, ZΓ	ve BΓZ açısı ΓBH açısına.
to the two ΓH and HB	δυσὶ ταῖς ΓH, HB	Çünkü gösterilmiş oldu ABH açısının bütününün eşit olduğu AΓZ açısının bütününe,
are equal,	ἴσαι εἰσὶν	ve bunların ΓBH parçasının (eşitliği) BΓZ parçasına,
either to either,	ἑκατέρα ἑκατέρᾳ·	dolayısıyla ABΓ kalanı eşittir AΓB kalanına;
and angle BZΓ	καὶ γωνία ἡ ὑπὸ BZΓ	
to angle ΓHB	γωνίᾳ τῇ ὑπὸ ΓHB	
[is] equal,	ἴση,	
and the common base of them is BΓ;	καὶ βάσις αὐτῶν κοινὴ ἡ BΓ·	
and therefore triangle BZΓ	καὶ τὸ BZΓ ἄρα τρίγωνον	
to triangle ΓHB	τῷ ΓHB τριγώνῳ	
will be equal,	ἴσον ἔσται,	
and the remaining angles	καὶ αἱ λοιπαὶ γωνίαι	
to the remaining angles	ταῖς λοιπαῖς γωνίαις	
will be equal,	ἴσαι ἔσονται	
either to either,	ἑκατέρα ἑκατέρᾳ,	
which the equal sides subtend.	ὑφ᾽ ἃς αἱ ἴσαι πλευραὶ ὑποτείνουσιν·	
Equal therefore is	ἴση ἄρα ἐστὶν	
ZBΓ to HΓB,	ἡ μὲν ὑπὸ ZBΓ τῇ ὑπὸ HΓB	
and BΓZ to ΓBH.	ἡ δὲ ὑπὸ BΓZ τῇ ὑπὸ ΓBH.	
Since then angle ABH as a whole	ἐπεὶ οὖν ὅλη ἡ ὑπὸ ABH γωνία	

DRAFT

to angle AΓZ as a whole	ὅλη τῇ ὑπὸ ΑΓΖ γωνίᾳ	ve bunlar ABΓ üçgeninin tabanıdır.
was shown equal,	ἐδείχθη ἴση,	Ve ZBΓ açısının eşit olduğu gösterilmişti HΓB açısına;
of which the [part] ΓBH to BΓZ	ὧν ἡ ὑπὸ ΓΒΗ τῇ ὑπὸ ΒΓΖ	
is equal,	ἴση,	
therefore the remainder ABΓ	λοιπὴ ἄρα ἡ ὑπὸ ΑΒΓ	ve bunlar tabanın altındadır.
to the remainder AΓB	λοιπῇ τῇ ὑπὸ ΑΓΒ	
is equal;	ἐστιν ἴση·	
and they are at the base	καί εἰσι πρὸς τῇ βάσει	
of the triangle ABΓ.	τοῦ ΑΒΓ τριγώνου.	
And was shown also	ἐδείχθη δὲ καὶ	
ZBΓ equal to HΓB;	ἡ ὑπὸ ΖΒΓ τῇ ὑπὸ ΗΓΒ ἴση·	
and they are under the base.	καί εἰσιν ὑπὸ τὴν βάσιν.	
Therefore, in isosceles triangles,	Τῶν ἰσοσκελῶν τριγώνων	Dolayısıyla bir ikizkenar üçgenin tabanındaki açılar birbirine eşittir,
the angles at the base	αἱ πρὸς τῇ βάσει γωνίαι	
are equal to one another,	ἴσαι ἀλλήλαις εἰσίν,	
and,	καὶ	ve, eşit doğrular uzatıldığında,
the equal STRAIGHTs being extended,	προσεκβληθεισῶν τῶν ἴσων εὐθειῶν	tabanın altında kalan açılar birbirine eşit olacaklar.
the angles under the base	αἱ ὑπὸ τὴν βάσιν γωνίαι	
will be equal to one another;	ἴσαι ἀλλήλαις ἔσονται·	— gösterilmesi gereken tam buydu.
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	



3.6

If in a triangle	Ἐὰν τριγώνου	Eğer bir üçgende
two angles be equal to one another,	αἱ δύο γωνίαι ἴσαι ἀλλήλαις ὦσιν,	birbirine eşit iki açısı varsa,
also the sides that subtend the equal angles	καὶ αἱ ὑπὸ τὰς ἴσας γωνίας ὑποτείνουσαι πλευραὶ	eşit açıların gördüğü kenarlar da birbirine eşit olacaklar.
will be equal to one another.	ἴσαι ἀλλήλαις ἔσονται.	
Let there be	Ἔστω	Verilmiş olsun,
a triangle, ABΓ,	τρίγωνον τὸ ΑΒΓ	bir ABΓ üçgeni,
having equal	ἴσην ἔχον	ABΓ açısı eşit olan
angle ABΓ	τὴν ὑπὸ ΑΒΓ γωνίαν	AΓB açısına.
to angle AΓB.	τῇ ὑπὸ ΑΓΒ γωνίᾳ·	
I say that	λέγω, ὅτι	İddia ediyorum ki
also side AB to side AΓ	καὶ πλευρὰ ἡ ΑΒ πλευρᾷ τῇ ΑΓ	AB kenarı da AΓ kenarına
is equal.	ἐστιν ἴση.	eşittir.
For if unequal is AB to AΓ,	Εἰ γὰρ ἄνισός ἐστιν ἡ ΑΒ τῇ ΑΓ,	Çünkü eğer AB eşit değil ise AΓ kenarına,
one of them is greater.	ἡ ἑτέρα αὐτῶν μείζων ἐστίν.	
Suppose AB be greater,	ἔστω μείζων ἡ ΑΒ,	biri daha büyüktür.
and there has been taken away	καὶ ἀφῃρήσθω	AB daha büyük olan olsun,

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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.

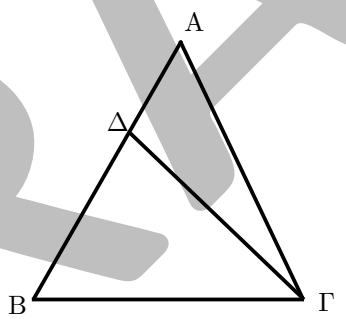
Ἐπεὶ οὖν ἴση ἐστὶν ἡ ΔB τῇ AΓ
κοινὴ δὲ ἡ BΓ,
δύο δὴ αἱ ΔB, BΓ
δύο ταῖς AΓ, ΓB
ἴσαι εἰσὶν
ἑκατέρα ἑκατέρᾳ,
καὶ γωνία ἡ ὑπὸ ΔBΓ
γωνίᾳ τῇ ὑπὸ AΓB
ἐστιν ἴση·
βάσις ἄρα ἡ ΔΓ βάσει τῇ AB
ἴση ἐστίν,
καὶ τὸ ΔBΓ τρίγωνον τῷ AΓB τριγώνῳ
ἴσον ἔσται,
τὸ ἔλασσον τῷ μείζονι·
ὅπερ ἄτοπον·
οὐκ ἄρα ἄνισός ἐστιν ἡ AB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

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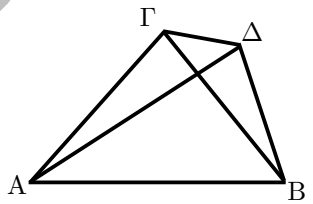
to two given STRAIGHTs ΑΓ, ΓΒ,	δύο ταῖς αὐταῖς εὐθείαις ταῖς ΑΓ, ΓΒ	verilmiş iki ΑΓ, ΓΒ doğrusuna
two other STRAIGHTs ΑΔ, ΔΒ,	ἄλλαι δύο εὐθεῖαι αἱ ΑΔ, ΔΒ	eşit başka iki ΑΔ, ΔΒ doğrusu
equal	ἴσαι	her biri birine
either to either	ἑκατέρα ἑκατέρᾳ	—diyelim inşa edilmiş olsunlar
suppose have been constructed[4]	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 açısından;
Greater therefore [is]	μείζων ἄρα	
ΑΔΓ than[6] ΔΓΒ;[7]	ἡ ὑπὸ ΑΔΓ τῆς ὑπὸ ΔΓΒ·	dolayısıyla ΓΔΒ çok daha büyüktür ΔΓΒ açısından.
by much, therefore, [is]	πολλῷ ἄρα	
ΓΔΒ greater than ΔΓΒ.	ἡ ὑπὸ ΓΔΒ μείζων ἐστί τῆς ὑπὸ ΔΓΒ.	Üstelik ΓΒ eşit olduğu için ΔΒ doğrusuna,
Moreover, since equal is ΓΒ to ΔΒ,	πάλιν ἐπεὶ ἴση ἐστὶν ἡ ΓΒ τῇ ΔΒ,	
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 gösterilmişti;
But it was also shown than it	ἐδείχθη δὲ αὐτῆς καὶ	
much greater;	πολλῷ μείζων·	ki bu saçmadır.
which is absurd.	ὅπερ ἐστὶν ἀδύνατον.	
Not, therefore,	Οὐκ ἄρα	Şöyle olmaz, dolayısıyla; aynı doğru üzerinde,
on the same STRAIGHT,	ἐπὶ τῆς αὐτῆς εὐθείας	
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.	



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

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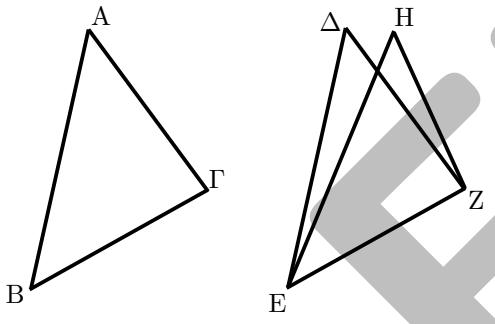
to angle EΔZ	ἐπὶ γωνίαν τὴν ὑπὸ EΔZ	açısına
will apply	ἐφαρμόσει	ve ona eşit olacak.
and will be equal to it.	καὶ ἴση αὐτῇ ἔσται.	
If, therefore, two triangles	Ἐὰν δύο τρίγωνα	Eğer, dolayısıyla, iki üçgenin,
two sides	τὰς δύο πλευρὰς	varsa iki kenarı
to two sides	[ταῖς] δύο πλευραῖς	eşit olan
have equal,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



3·9

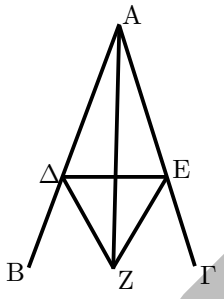
The[1] given rectilineal angle	Τὴν δοθεῖσαν γωνίαν εὐθύγραμμον	Verilen düzkenar açıyı
to cut in two.[2]	δίχα τεμεῖν.	ikiye kesmek.
Let be	Ἔστω	Verilmiş olsun
the given rectilineal angle	ἡ δοθεῖσα γωνία εὐθύγραμμος	düzkenar bir açı, BAΓ.
BAΓ.	ἡ ὑπὸ BAΓ.	
Then it is necessary	δεῖ δὴ	Şimdi gereklidir
to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

[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.

DRAFT

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

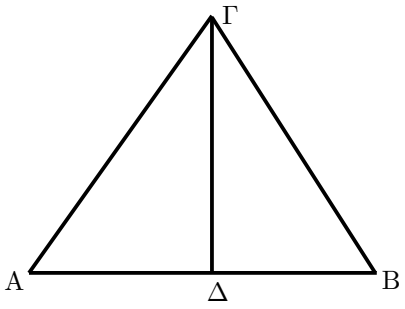


3.10

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

DRAFT

—just what it was necessary to do.



3.11

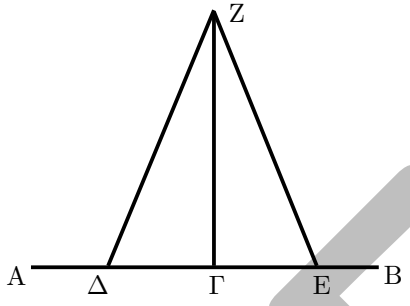
To the given STRAIGHT from the given point on it at right angles to draw[1] a straight line.[2]	Τῇ δοθείσῃ εὐθείᾳ ἀπὸ τοῦ πρὸς αὐτῇ δοθέντος σημείου πρὸς ὀρθὰς γωνίας εὐθεῖαν γραμμὴν ἀγαγεῖν.	Verilen bir doğruya üzerinde verilen bir noktada dik açılarda bir doğru çizmek.
Let be the given STRAIGHT AB,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

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

[2] Literally 'lead, conduct'.

DRAFT

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	
ΔΓZ and ZΓE.	ὑπὸ ΔΓZ, ZΓE.	
Therefore, to the given STRAIGHT AB,	Τῇ ἄρα δοθείσῃ εὐθείᾳ τῇ AB	Dolayısıyla, verilen AB 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 ΓZ doğrusu çizilmişoldu;
has been drawn the straight line ΓZ;	εὐθεῖα γραμμὴ ἤχται ἡ ΓZ·	— 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 AB,	ἡ μὲν δοθεῖσα εὐθεῖα ἄπειρος ἡ AB	bir sınırlanmamış doğru, AB,
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 AB sınırlanmamış doğrusuna
AB	τὴν AB	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	AB doğrusunun diğer tarafında
of the STRAIGHT AB	τῆς AB 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, EZH,
a circle has been drawn, EZH,	κύκλος γεγράφθω ὁ EZH,	ve EH doğrusu Θ noktasında ikiye ke-
and has been cut	καὶ τετμήσθω	silmiş olsun,
the STRAIGHT EH	ἡ EH εὐθεῖα	ve birleştirilmiş olsun
in two at Θ,	δίχα κατὰ τὸ Θ,	ΓH, ΓΘ, ve ΓE doğruları.
and there have been joined	καὶ ἐπεζεύχθωσαν	
the STRAIGHTS ΓH, ΓΘ, and ΓE.	αἱ ΓH, ΓΘ, ΓE εὐθεῖαι·	
I say that	λέγω, ὅτι	İddia ediyorum ki
to the given unbounded STRAIGHT	ἐπὶ τὴν δοθεῖσαν εὐθεῖαν ἄπειρον	verilen sınırlanmamış AB doğrusuna,
AB,	τὴν AB	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.

DRAFT

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.

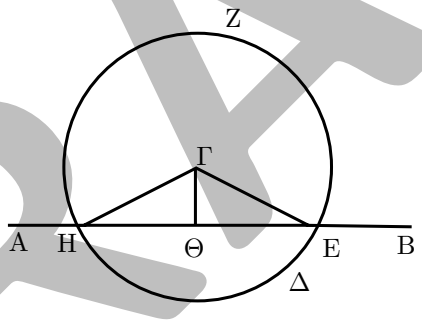
κάθετος ἤχται ἡ ΓΘ.
Ἐπεὶ γὰρ ἴση ἐστὶν ἡ ΗΘ τῇ ΘΕ,
κοινὴ δὲ ἡ ΘΓ,
δύο δὴ αἱ ΗΘ, ΘΓ
δύο ταῖς ΕΘ, ΘΓ ἴσαι εἰσὶν
ἑκατέρα ἑκατέρᾳ·
καὶ βάσις ἡ ΓΗ βάσει τῇ ΓΕ
ἐστιν ἴση·
γωνία ἄρα ἡ ὑπὸ ΓΘΗ
γωνίᾳ τῇ ὑπὸ ΕΘΓ
ἐστιν ἴση.
καί εἰσιν ἐφεξῆς.
ὅταν δὲ εὐθεῖα
ἐπ᾽ εὐθεῖαν σταθεῖσα
τὰς ἐφεξῆς γωνίας
ἴσας ἀλλήλαις ποιῇ,
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 AB,
from the given point Γ,
which is not on it,
a perpendicular ΓΘ has been drawn;
—just what it was necessary to do.

Ἐπὶ τὴν δοθεῖσαν ἄρα εὐθεῖαν ἄπειρον τὴν ΑΒ
ἀπὸ τοῦ δοθέντος σημείου τοῦ Γ,
ὃ μή ἐστιν ἐπ᾽ αὐτῆς,
κάθετος ἤχται ἡ ΓΘ·
ὅπερ ἔδει ποιῆσαι.

Dolayısıyla, verilen AB 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].

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

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

If equal is

Ἐὰν εὐθεῖα
ἐπ᾽ εὐθεῖαν σταθεῖσα
γωνίας ποιῇ,
ἤτοι δύο ὀρθὰς
ἢ δυσὶν ὀρθαῖς ἴσας
ποιήσει.

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

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

Εἰ μὲν οὖν ἴση ἐστὶν

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

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

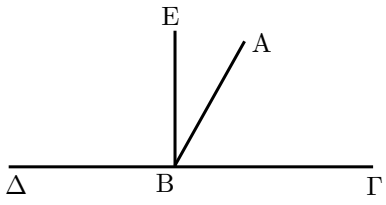
İddia ediyorum ki
ΓΒΑ ve ΑΒΔ açıları
ya iki dik açıdır
ya da iki dik açıya eşittir(ler).

Eğer ΓΒΑ eşitse ΑΒΔ açısına,

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

DRAFT

ΓBA to ABΔ, they are two RIGHTS.	ἡ ὑπὸ ΓBA τῇ ὑπὸ ABΔ, δύο ὀρθαί εἰσιν.	iki dik açıdırlar.
If not, suppose there has been drawn, from the point B, to the [STRAIGHT] ΓΔ, at right angles, BE.	εἰ δὲ οὔ, ἤχθω ἀπὸ τοῦ B σημείου τῇ ΓΔ [εὐθείᾳ] πρὸς ὀρθὰς ἡ BE·	Eğer değilse, kabul edelim ki çizilmiş olsun, B noktasından, ΓΔ doğrusuna, dik açılarda, BE.
Therefore ΓBE and EBΔ are two RIGHTS; and since ΓBE to the two, ΓBA and ABE, is equal let there be added in common EBΔ. Therefore ΓBE and EBΔ to the three, ΓBA, ABE, and EBΔ, are equal.	αἱ ἄρα ὑπὸ ΓBE, EBΔ δύο ὀρθαί εἰσιν· καὶ ἐπεὶ ἡ ὑπὸ ΓBE δυσὶ ταῖς ὑπὸ ΓBA, ABE ἴση ἐστίν, κοινὴ προσκείσθω ἡ ὑπὸ EBΔ· αἱ ἄρα ὑπὸ ΓBE, EBΔ τρισὶ ταῖς ὑπὸ ΓBA, ABE, EBΔ ἴσαι εἰσίν.	Dolayısıyla ΓBE ve EBΔ iki diktir; ve olduğundan ΓBE eşit ΓBA ve ABE ikilisine, EBΔ her birine eklenmiş olsun. Dolayısıyla ΓBE ve EBΔ eşittirler, ΓBA, ABE ve EBΔ üçlüsüne.
Moreover, since ΔBA to the two, ΔBE and EBA, is equal let there be added in common ABΓ; therefore ΔBA and ABΓ to the three, ΔBE, EBA, and ABΓ, are equal.	πάλιν, ἐπεὶ ἡ ὑπὸ ΔBA δυσὶ ταῖς ὑπὸ ΔBE, EBA ἴση ἐστίν, κοινὴ προσκείσθω ἡ ὑπὸ ABΓ· αἱ ἄρα ὑπὸ ΔBA, ABΓ τρισὶ ταῖς ὑπὸ ΔBE, EBA, ABΓ ἴσαι εἰσίν.	Dahası, olduğundan ΔBA eşit, ΔBE ve EBA ikilisine, ABΓ her birine eklenmiş olsun; dolayısıyla ΔBA ve ABΓ eşittirler, ΔBE, EBA ve ABΓ üçlüsüne.
And ΓBE and EBΔ were shown equal to the same three. And equals to the same are also equal to one another; also, therefore, ΓBE and EBΔ to ΔBA and ABΓ are equal; but ΓBE and EBΔ are two RIGHTS; and therefore ΔBA and ABΓ are equal to two RIGHTS.	ἐδείχθησαν δὲ καὶ αἱ ὑπὸ ΓBE, EBΔ τρισὶ ταῖς αὐταῖς ἴσαι· τὰ δὲ τῷ αὐτῷ ἴσα καὶ ἀλλήλοις ἐστὶν ἴσα· καὶ αἱ ὑπὸ ΓBE, EBΔ ἄρα ταῖς ὑπὸ ΔBA, ABΓ ἴσαι εἰσίν· ἀλλὰ αἱ ὑπὸ ΓBE, EBΔ δύο ὀρθαί εἰσιν· καὶ αἱ ὑπὸ ΔBA, ABΓ ἄρα δυσὶν ὀρθαῖς ἴσαι εἰσίν.	Ve ΓBE ve EBΔ açılarının göster- ilmişti eşitliği aynı üçlüye. Ve aynı şeye eşit olanlar birbirine eşit- tir; ve, dolayısıyla, ΓBE ve EBΔ eşittirle ΔBA ve ABΓ açılarına; ama ΓBE veEBΔ iki diktir; ve dolayısıyla ΔBA ve ABΓ 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,

DRAFT

on a STRAIGHT	ἐπ᾽ εὐθείας	bir doğruda
will be with one another	ἔσονται ἀλλήλαις	kalacaklar ikisi birlikte,
the STRAIGHTS.	αἱ εὐθεῖαι.	doğruların.
For, to some STRAIGHT, AB,	Πρὸς γάρ τινι εὐθείᾳ τῇ AB	Bir AB doğrusuna,
and at the same point, B,	καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ B	ve bir B noktasında,
two STRAIGHTS BΓ and BΔ,	δύο εὐθεῖαι αἱ BΓ, BΔ	aynı tarafında kalmayan,
not lying to the same parts,	μὴ ἐπὶ τὰ αὐτὰ μέρη κείμεναι	iki BΓ ve BΔ doğrularının,
the adjacent angles	τὰς ἐφεξῆς γωνίας	ABΓ ve ABΔ
ABΓ and ABΔ	τὰς ὑπὸ ABΓ, ABΔ	bitişik açılarının iki dik açı
equal to two RIGHTS	δύο ὀρθαῖς ἴσας	—olduğu kabul edilsin.
—suppose they make.	ποιείτωσαν·	
I say that	λέγω, ὅτι	İddia ediyorum ki
on a STRAIGHT	ἐπ᾽ εὐθείας	BΔ ile ΓB bir doğrudadır.
with ΓB is BΔ.	ἐστὶ τῇ ΓB ἡ BΔ.	
For, if it is not	Εἰ γὰρ μή ἐστι	Çünkü, eğer değilse
with BΓ on a STRAIGHT,	τῇ BΓ ἐπ᾽ εὐθείας	bir doğruda BΓ ile,
[namely] BΔ,	ἡ BΔ,	BΔ,
let there be,	ἔστω	olsun,
with BΓ in a STRAIGHT,	τῇ ΓB ἐπ᾽ εὐθείας	bir doğruda BΓ ile,
BE.	ἡ BE.	BE.
For, since the STRAIGHT AB	Ἐπεὶ οὖν εὐθεῖα ἡ AB	Çünkü, AB doğrusu
has stood[1] to the STRAIGHT ΓBE,	ἐπ᾽ εὐθεῖαν τὴν ΓBE ἐφέστηκεν,	dikiltilmiş olur ΓBE doğrusuna,
therefore angles ABΓ and ABE	αἱ ἄρα ὑπὸ ABΓ, ABE γωνίαι	dolayısıyla ABΓ ve ABE açıları
are equal to two RIGHTS.	δύο ὀρθαῖς ἴσαι εἰσίν·	eşittirler iki dik açıya.
Also ABΓ and ABΔ	εἰσὶ δὲ καὶ αἱ ὑπὸ ABΓ, ABΔ	Ayrıca ABΓ ve ABΔ
are equal to two RIGHTS.	δύο ὀρθαῖς ἴσαι·	eşittirler iki dik açıya.
Therefore ΓBA and ABE	αἱ ἄρα ὑπὸ ΓBA, ABE	Dolayısıyla ΓBA ve ABE
are equal to ΓBA and ABΔ.	ταῖς ὑπὸ ΓBA, ABΔ ἴσαι εἰσίν.	eşittirler ΓBA ve ABΔ açılarına.
In common	κοινὴ	Ortak ΓBA açısının çıkartıldığı kabul
suppose there has been taken away	ἀφῃρήσθω	edilsin.
ΓBA;	ἡ ὑπὸ ΓBA·	Dolayısıyla ABE kalanı
therefore the remainder ABE	λοιπὴ ἄρα ἡ ὑπὸ ABE	eşittir ABΔ kalanına,
to the remainder ABΔ is equal,	λοιπῇ τῇ ὑπὸ ABΔ ἐστιν ἴση,	küçük olan büyüğe;
the less to the greater;	ἡ ἐλάσσων τῇ μείζονι·	ki bu imkansızdır.
which is impossible.	ὅπερ ἐστὶν ἀδύνατον.	Dolayısıyla değildir [durum] şöyle;
Therefore it is not [the case that]	οὐκ ἄρα	BE bir doğrudadır ΓB doğrusuyla.
BE is on a STRAIGHT with ΓB.	ἐπ᾽ εὐθείας ἐστὶν ἡ BE τῇ ΓB.	Benzer şekilde göstereceğiz ki
Similarly we[2] shall show that	ὁμοίως δὴ δείξομεν, ὅτι	hiçbiri [öyledir], BΔ dışında.
no other [is so], except BΔ.	οὐδὲ ἄλλη τις πλὴν τῆς BΔ·	Dolayısıyla ΓB bir doğrudadır BΔ ile.
Therefore on a STRAIGHT	ἐπ᾽ εὐθείας ἄρα	
is ΓB with BΔ.	ἐστὶν ἡ ΓB τῇ BΔ.	
If, therefore, to some STRAIGHT,	Ἐὰν ἄρα πρός τινι εὐθείᾳ	Eğer, dolayısıyla, bir doğruya,
and at the same point,	καὶ τῷ πρὸς αὐτῇ σημείῳ	ve aynı noktasında,
two STRAIGHTS,	δύο εὐθεῖαι	iki doğru,
not lying in the same parts,	μὴ ἐπὶ αὐτὰ μέρη κείμεναι	aynı tarafında kalmayan,
adjacent angles	τὰς ἐφεξῆς γωνίας	yaparsa
two right angles	δυσὶν ὀρθαῖς ἴσας	iki dik açıya eşit
make,	ποιῶσιν,	bitişik açılar,
on a STRAIGHT	ἐπ᾽ εὐθείας	bir doğruda
will be with one another	ἔσονται ἀλλήλαις	kalacaklar ikisi birlikte,
the STRAIGHTS;	αἱ εὐθεῖαι·	doğruların.
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	— 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*.

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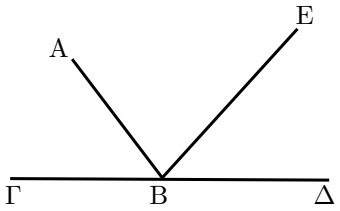
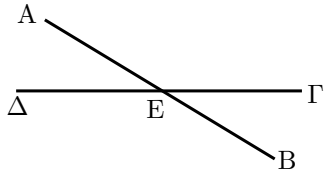


3·15

If two straights cut one another, the vertical[1] angles they make equal to one another.	Ἐὰν δύο εὐθεῖαι τέμνωσιν ἀλλήλας, τὰς κατὰ κορυφὴν γωνίας ἴσας ἀλλήλαις ποιοῦσιν.	Eğer iki doğru keserse birbirini, dikey açılar oluşturlar eşit bir birine.
For, let the straights AB and ΓΔ cut one another at the point E.	Δύο γὰρ εὐθεῖαι αἱ ΑΒ, ΓΔ τεμνέτωσαν ἀλλήλας κατὰ τὸ Ε σημεῖον·	Çünkü, AB ve ΓΔ doğruları kessinler bir birlerini E noktasında.
I say that equal are angle ΑΕΓ to ΔΕΒ, and ΓΕΒ to ΑΕΔ.	λέγω, ὅτι ἴση ἐστὶν ἡ μὲν ὑπὸ ΑΕΓ γωνία τῇ ὑπὸ ΔΕΒ, ἡ δὲ ὑπὸ ΓΕΒ τῇ ὑπὸ ΑΕΔ.	İddia ediyorum ki eşittirler ΑΕΓ açısı ΔΕΒ açısına, ve ΓΕΒ açısı ΑΕΔ açısına.
For, since the straight ΑΕ has stood to the straight ΓΔ, making angles ΓΕΑ and ΑΕΔ, therefore angles ΓΕΑ and ΑΕΔ are equal to two rights. Moreover, since the straight ΔΕ has stood to the straight ΑΒ, making angles ΑΕΔ and ΔΕΒ, therefore angles ΑΕΔ and ΔΕΒ are equal to two rights. And ΓΕΑ and ΑΕΔ were shown equal to two rights; therefore ΓΕΑ and ΑΕΔ are equal to ΑΕΔ and ΔΕΒ. In common suppose there has been taken away ΑΕΔ; therefore the remainder ΓΕΑ is equal to the remainder ΒΕΔ; similarly it will be shown that also ΓΕΒ and ΔΕΑ are equal.[2]	Ἐπεὶ γὰρ εὐθεῖα ἡ ΑΕ ἐπ᾽ εὐθεῖαν τὴν ΓΔ ἐφέστηκε γωνίας ποιοῦσα τὰς ὑπὸ ΓΕΑ, ΑΕΔ, αἱ ἄρα ὑπὸ ΓΕΑ, ΑΕΔ γωνίαι δυσὶν ὀρθαῖς ἴσαι εἰσίν. πάλιν, ἐπεὶ εὐθεῖα ἡ ΔΕ ἐπ᾽ εὐθεῖαν τὴν ΑΒ ἐφέστηκε γωνίας ποιοῦσα τὰς ὑπὸ ΑΕΔ, ΔΕΒ, αἱ ἄρα ὑπὸ ΑΕΔ, ΔΕΒ γωνίαι δυσὶν ὀρθαῖς ἴσαι εἰσίν. ἐδείχθησαν δὲ καὶ αἱ ὑπὸ ΓΕΑ, ΑΕΔ δυσὶν ὀρθαῖς ἴσαι· αἱ ἄρα ὑπὸ ΓΕΑ, ΑΕΔ ταῖς ὑπὸ ΑΕΔ, ΔΕΒ ἴσαι εἰσίν. κοινὴ ἀφῃρήσθω ἡ ὑπὸ ΑΕΔ· λοιπὴ ἄρα ἡ ὑπὸ ΓΕΑ λοιπῇ τῇ ὑπὸ ΒΕΔ ἴση ἐστίν· ὁμοίως δὴ δειχθήσεται, ὅτι καὶ αἱ ὑπὸ ΓΕΒ, ΔΕΑ ἴσαι εἰσίν.	Çünkü, AE doğrusu dikiltilmişti ΓΔ doğrusuna, oluşturarak ΓΕΑ ve ΑΕΔ açılarını, dolayısıyla ΓΕΑ ve ΑΕΔ açıları eşittirler iki dik açıya. Dahası, ΔE doğrusu dikiltilmişti AB doğrusuna, oluşturarak ΑΕΔ ve ΔΕΒ açılarını, dolayısıyla ΑΕΔ ve ΔΕΒ açıları eşittirler iki dik açıya. Ve ΓΕΑ ve ΑΕΔ açılarının göster- ilmişti eşitliği iki dik açıya, dolayısıyla ΓΕΑ ve ΑΕΔ eşittirler ΑΕΔ ve ΔΕΒ açılarına. Ortak ΑΕΔ açısının çıkartılmış olduğu kabul edilsin; dolayısıyla ΓΕΑ kalanı eşittir ΒΕΔ kalanına; benzer şekilde gösterilecek ki ΓΕΒ açısı da eşittir ΔΕΑ açısına.
If, therefore, two straights cut one another, the vertical angles they make equal to one another; —just what it was necessary to show.	Ἐὰν ἄρα δύο εὐθεῖαι τέμνωσιν ἀλλήλας, τὰς κατὰ κορυφὴν γωνίας ἴσας ἀλλήλαις ποιοῦσιν· ὅπερ ἔδει δεῖξαι.	Eğer, dolayısıyla, iki doğru keserse bir birini, dikey açılar oluşturlar eşit birbirine — 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, AB has been cut in two 'at Δ', κατὰ τὸ Δ. But κορυφή and the Latin *vertex* can both mean *crown of the head,* and in anatomical use, the English *vertical* refers to this crown. Apollonius uses κορυφή for the vertex of a cone [17, pp. 286–7].

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

DRAFT

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.

λέγω, 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.

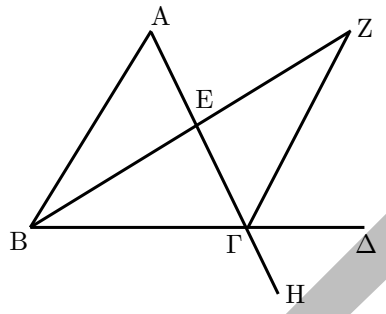
Since equal are
ΑΕ to ΕΓ,
and ΒΕ to ΕΖ,
the two, ΑΕ and ΕΒ
to the two, ΓΕ and ΕΖ,
are equal,
either to either;
and angle ΑΕΒ
is equal to angle ΖΕΓ;
for they are vertical;
therefore the base ΑΒ
is equal to the base ΖΓ,
and triangle ΑΒΕ
is equal to triangle ΖΕΓ,
and the remaining angles
are equal to the 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.

DRAFT

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



3.17

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

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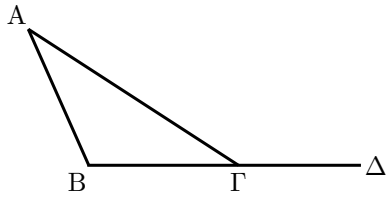
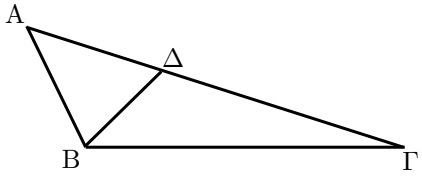


3.18

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.

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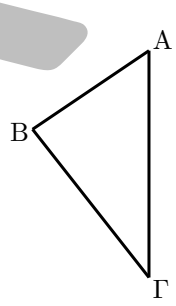
under the greater angle the greater side subtends.[1]	ὑπὸ τὴν μείζονα γωνίαν ἡ μείζων πλευρὰ ὑποτείνει.	daha büyük bir açı, daha büyük bir kenarca karşılanır.
For, let there be a triangle, ΑΒΓ, having angle ΑΒΓ greater than ΒΓΑ.	Ἔστω τρίγωνον τὸ ΑΒΓ μείζονα ἔχον τὴν ὑπὸ ΑΒΓ γωνίαν τῆς ὑπὸ ΒΓΑ·	Çünkü,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



3.20

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

DRAFT

are greater than the remaining one,
—taken anyhow,
BA and AΓ, than BΓ,
AB and BΓ, than AΓ,
BΓ and ΓA, than AB.

τῆς λοιπῆς μείζονές εἰσι
πάντῃ μεταλαμβανόμεναι,
αἱ μὲν BA, AΓ τῆς BΓ,
αἱ δὲ AB, BΓ τῆς AΓ,
αἱ δὲ BΓ, ΓA τῆς AB.

daha büyüktür geriye kalandan
—nasıl seçilirse seçilsin,
BA ve AΓ, BΓ kenarından,
AB ve BΓ, AΓ kenarından,
BΓ ve ΓA, AB kenarından.

For, suppose has been drawn through
BA to a point Δ,
and there has been laid down
AΔ equal to ΓA,
and there has been joined
ΔΓ.

Διήχθω γὰρ
ἡ BA ἐπὶ τὸ Δ σημεῖον,
καὶ κείσθω
τῇ ΓA ἴση ἡ AΔ,
καὶ ἐπεζεύχθω
ἡ ΔΓ.

Çünkü, çizilmiş olsun
BA kenarı geçerek bir Δ noktasından,
ve yerleştirilmiş olsun
AΔ, ΓA kenarına eşit olan,
ve birleştirilmiş olsun
ΔΓ.

Since ΔA is equal to AΓ,
equal also is
angle AΔΓ to AΓΔ.
Therefore BΓΔ is greater than AΔΓ;
also, since there is a triangle, ΔΓB,[1]
having angle ΓBΔ greater
than ΔBΓ,
and under the greater angle
the greater side subtends,
therefore ΔB is greater than BΓ.
But ΔA is equal to AΓ;
therefore BA and AΓ are greater
than BΓ;
similarly we shall show that
AB and BΓ than ΓA
are greater,
and BΓ and ΓA than AB.

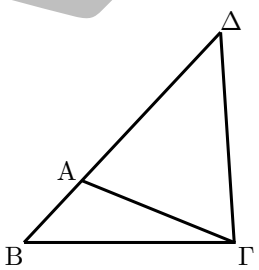
Ἐπεὶ οὖν ἴση ἐστὶν ἡ ΔA τῇ AΓ,
ἴση ἐστὶ καὶ
γωνία ἡ ὑπὸ AΔΓ τῇ ὑπὸ AΓΔ·
μείζων ἄρα ἡ ὑπὸ BΓΔ τῆς ὑπὸ AΔΓ·
καὶ ἐπεὶ τρίγωνόν ἐστι τὸ ΔΓB
μείζονα ἔχον τὴν ὑπὸ BΓΔ γωνίαν
τῆς ὑπὸ BΔΓ,
ὑπὸ δὲ τὴν μείζονα γωνίαν
ἡ μείζων πλευρὰ ὑποτείνει,
ἡ ΔB ἄρα τῆς BΓ ἐστι μείζων.
ἴση δὲ ἡ ΔA τῇ AΓ·
μείζονες ἄρα αἱ BA, AΓ
τῆς BΓ·
ὁμοίως δὴ δείξομεν, ὅτι
καὶ αἱ μὲν AB, BΓ τῆς ΓA
μείζονές εἰσιν,
αἱ δὲ BΓ, ΓA τῆς AB.

ΔA eşit olduğundan AΓ kenarına,
eşittir ayrıca
AΔΓ, AΓΔ açısına.
Dolayısıyla BΓΔ büyüktür, AΔΓ açısından;
yine, ΔΓB, bir üçgen olduğundan,
ΓBΔ daha büyük olan
ΔBΓ açısından,
daha büyük açı
daha büyük kenarca karşılandışından,
dolayısıyla ΔB büyüktür BΓ kenarından.
Ama ΔA eşittir AΓ kenarına;
dolayısıyla BA ve AΓ büyüktürler
BΓ kenarından;
benzer şekilde göstereceğiz ki
AB ve BΓ, ΓA kenarından
büyüktürler,
ve BΓ ve ΓA, AB 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* [ΔΓB] is a triangle...'

DRAFT

but will contain the a greater angle.

For, of a triangle, ABΓ,
on one of the sides, BΓ,
from its extremities, B and Γ,
suppose two straights have been constructed within,
BΔ 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, ABΓ üçgeninin,
bir BΓ kenarının
B ve Γ uçlarından,
içeride iki doğru inşa edilmiş olsun;
BΔ ve ΔΓ.

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

λέγω, ὅτι
αἱ 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
BΔ ve ΔΓ
üçgenin geriye kalan iki
BA ve AΓ kenarından,
daha küçütürler,
ama içerirler,
BAΓ açısından daha büyük BΔΓ açısını.

For, let BΔ be drawn through to E.

Διήχθω γὰρ ἡ ΒΔ ἐπὶ τὸ Ε.

Çünkü, BΔ çizilmiş olsun E noktasına doğru.

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

καὶ ἐπεὶ παντὸς τριγώνου
αἱ δύο πλευραὶ τῆς λοιπῆς
μείζονές εἰσιν,
τοῦ 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,
ABE üçgeninin,
iki kenarı, AB ve AE
büyüktür BE kenarından;
ortak olarak eklenmiş olsun
EΓ;
dolayısıyla BA ve AΓ, BE ve EΓ kenarlarından
büyüktürler.
Dahası,
ΓEΔ üçgeninin,
iki kenarları, ΓE ve EΔ
büyüktür ΓΔ kenarından,
ortak olarak eklenmiş olsun
ΔB;
dolayısıyla ΓE ve EB, ΓΔ ve ΔB kenarlarından
büyüktürler.
Ama BE ve EΓ kenarlarından
BA ve AΓ kenarlarının gösterilmişti büyüklüğü;
dolayısıyla çok daha büyüktür
BA ve AΓ, BΔ ve ΔΓ kenarlarından.

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

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, ΓΔE üçgeninin
dış açısı BΔΓ
büyüktür ΓEΔ açısından.
Aynı [sebepten] tekrar,
ABE üçgeninin,
dış açısı ΓEB
büyüktür BAΓ açısından.
Ama ΓEB 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.

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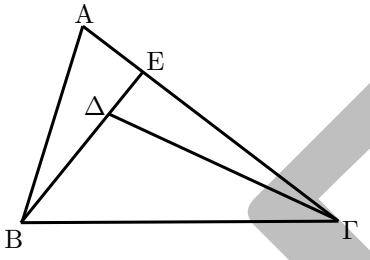
BΔΓ was shown greater; therefore by much BΔΓ is greater than BAΓ.	μείζων ἐδείχθη ἡ ὑπὸ BΔΓ· πολλῷ ἄρα ἡ ὑπὸ BΔΓ μείζων ἐστὶ τῆς ὑπὸ BAΓ.	BΔΓ açısının büyüklüğü gösterilmişti; dolayısıyla çok daha büyüktür BΔΓ, BAΓ açısından.
If, therefore, of a triangle, on one of the sides, from its extremities, two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



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

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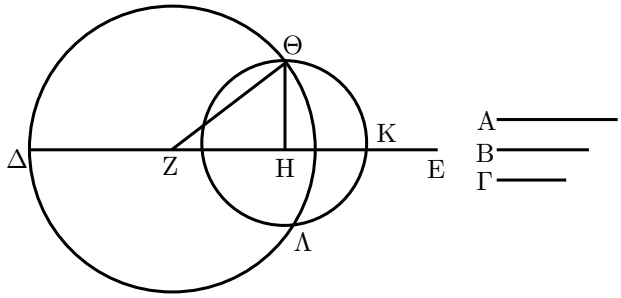
and there is laid down	καὶ κείσθω	yerleştirilmiş olsun
ΔZ equal to A,	τῇ μὲν A ἴση ἡ ΔZ,	A doğrusuna eşit ΔZ,
ZH equal to B,	τῇ δὲ B ἴση ἡ ZH,	B doğrusuna eşit ZH,
and HΘ equal to Γ;	τῇ δὲ Γ ἴση ἡ HΘ·	ve Γ doğrusuna eşit HΘ ;
and to center Z	καὶ κέντρῳ μὲν τῷ Z,	ve Z merkezine
at distance ZΔ	διαστήματι δὲ τῷ ZΔ	ZΔ uzaklığında
a circle has been drawn, ΔΚΛ;	κύκλος γεγράφθω ὁ ΔΚΛ·	bir ΔΚΛ çemberi çizilmiş olsun;
moreover,	πάλιν	dahası,
to center H,	κέντρῳ μὲν τῷ H,	H merkezine,
at distance HΘ,	διαστήματι δὲ τῷ HΘ	HΘ uzaklığında,
circle ΚΛΘ has been drawn,	κύκλος γεγράφθω ὁ ΚΛΘ,	ΚΛΘ çemberi çizilmiş olsun,
and KZ and KH have been joined.	καὶ ἐπεζεύχθωσαν αἱ KZ, KH·	ve KZ ile KH birleştirilmiş olsun.
I say that	λέγω, ὅτι	İddia ediyorum ki
from three straights	ἐκ τριῶν εὐθειῶν	üç doğrudan
equal to A, B, and Γ,	τῶν ἴσων ταῖς A, B, Γ	A, B ve Γ doğrularına eşit olan
a triangle has been constructed, KZH.	τρίγωνον συνέσταται τὸ KZH.	bir KZH üçgeni inşa edilmiştir.
For, since the point Z	Ἐπεὶ γὰρ τὸ Z σημεῖον	Çünkü merkezi olduğundan Z noktası,
is the center of circle ΔΚΛ,	κέντρον ἐστὶ τοῦ ΔΚΛ κύκλου,	ΔΚΛ çemberinin,
ZΔ is equal to ZK;	ἴση ἐστὶν ἡ ZΔ τῇ ZK·	ZΔ eşittir ZK doğrusuna;
but ZΔ is equal to A.	ἀλλὰ ἡ ZΔ τῇ A ἐστιν ἴση.	ama ZΔ eşittir A doğrusuna.
And KZ is therefore equal to A.	καὶ ἡ KZ ἄρα τῇ A ἐστιν ἴση.	Ve KZ dolayısıyla A doğrusuna eşittir.
Moreover,	πάλιν,	Dahası,
since the point H	ἐπεὶ τὸ H σημεῖον	merkezi olduğundan H noktası
is the center of circle ΛΚΘ,	κέντρον ἐστὶ τοῦ ΛΚΘ κύκλου,	ΛΚΘ çemberinin,
HΘ is equal to HK;	ἴση ἐστὶν ἡ HΘ τῇ HK·	HΘ eşittir HK doğrusuna;
but HΘ is equal to Γ;	ἀλλὰ ἡ HΘ τῇ Γ ἐστιν ἴση·	ama HΘ eşittir Γ doğrusuna;
and KH is therefore equal to Γ.	καὶ ἡ KH ἄρα τῇ Γ ἐστιν ἴση.	ve KH dolayısıyla Γ doğrusuna eşittir.
and ZH is equal to B;	ἐστὶ δὲ καὶ ἡ ZH τῇ B ἴση·	ve ZH eşittir B doğrusuna;
therefore the three straights,	αἱ τρεῖς ἄρα εὐθεῖαι	dolayısıyla üç doğru,
KZ, ZH, and HK	αἱ KZ, ZH, HK	KZ, ZH ve HK
are equal to the three, A, B, and Γ.	τρισὶ ταῖς A, B, Γ ἴσαι εἰσίν.	eşittirler A, B ve Γ üçlüsüne.
Therefore, from the three straights	Ἐκ τριῶν ἄρα εὐθειῶν	
KZ, ZH, and HK,	τῶν KZ, ZH, HK,	
which are equal	αἵ εἰσιν ἴσαι	
to the three given straights	τρισὶ ταῖς δοθείσαις εὐθείαις	
A, B, and Γ,	ταῖς A, B, Γ,	
a triangle has been constructed, KZH;	τρίγωνον συνέσταται τὸ KZH·	
—just what it was necessary to show.	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.



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At the given straight,	Πρὸς τῇ δοθείσῃ εὐθείᾳ	Verilmiş bir doğruda,

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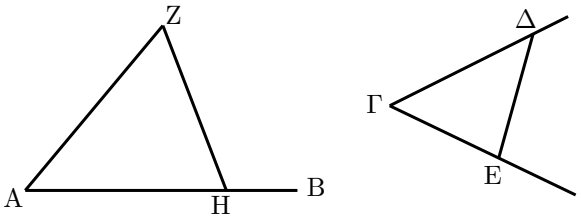
and at the given point on it, equal to the given rectilineal angle, a rectilineal angle to be constructed.	καὶ τῷ πρὸς αὐτῇ σημείῳ τῇ δοθείσῃ γωνίᾳ εὐθυγράμμῳ ἴσην γωνίαν εὐθύγραμμον συστήσασθαι.	ve üzerinde verilmiş noktada, verilmiş düzkenar açıya eşit olan, bir düzkenar açı inşa edilmesi.
Let be the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



3·24

If two triangles two sides to two sides	Ἐὰν δύο τρίγωνα τὰς δύο πλευρὰς [ταῖς] δύο πλευραῖς	Eğer iki üçgenin (birinin) iki kenarı (diğerinin) iki kenarına

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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, AB and AΓ,	τὰς δύο πλευρὰς τὰς ΑΒ, ΑΓ	— iki AB ve AΓ kenarı,
to two sides, ΔE and ΔZ,	ταῖς δύο πλευραῖς ταῖς ΔΕ, ΔΖ	iki ΔE ve ΔZ kenarına,
having equal,	ἴσας ἔχοντα	eşit olan,
either to either,	ἑκατέραν ἑκατέρᾳ,	her biri birine,
AB to ΔE,	τὴν μὲν ΑΒ τῇ ΔΕ	AB, ΔE kenarına,
and AΓ to ΔZ,	τὴν δὲ ΑΓ τῇ ΔΖ,	ve AΓ, ΔZ kenarına,
—and the angle at A,	ἡ δὲ πρὸς τῷ Α γωνία	—ve A 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 BΓ	καὶ βάσις ἡ ΒΓ	BΓ tabanı da
than the base EZ	βάσεως τῆς ΕΖ	EZ 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, ΔE,	πρὸς τῇ ΔΕ εὐθείᾳ	ΔE 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 AΓ and ΔZ equal,	ὁποτέρᾳ τῶν ΑΓ, ΔΖ ἴση	AΓ ve ΔZ kenarlarının ikisine de eşit,
ΔH,	ἡ ΔΗ,	ΔH,
and suppose have been joined	καὶ ἐπεζεύχθωσαν	ve birleştirilmiş olsun
EH and ZH.	αἱ ΕΗ, ΖΗ.	EH ve ZH.
Since [it] is equal,	Ἐπεὶ οὖν ἴση ἐστὶν	Eşit olduğundan,
AB to ΔE,	ἡ μὲν ΑΒ τῇ ΔΕ,	AB, ΔE kenarına,
and AΓ to ΔH,	ἡ δὲ ΑΓ τῇ ΔΗ,	ve AΓ, ΔH kenarına,
the two, BA and AΓ,	δύο δὴ αἱ ΒΑ, ΑΓ	BA ve AΓ ikilisi,
to the two, EΔ and ΔH,	δυσὶ ταῖς ΕΔ, ΔΗ	EΔ ve ΔH 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 BΓ	βάσις ἄρα ἡ ΒΓ	dolayısıyla BΓ tabanı
to the base EH is equal.	βάσει τῇ ΕΗ ἐστιν ἴση.	EH tabanına eşittir.
Moreover,	πάλιν,	Dahası,
since [it] is equal,	ἐπεὶ ἴση ἐστὶν	eşit olduğundan,
[namely] ΔZ to ΔH,	ἡ ΔΖ τῇ ΔΗ,	ΔZ, ΔH kenarına,
[it] too is equal,	ἴση ἐστὶ καὶ	yine eşittir,
[namely] angle ΔHZ to ΔZH;	ἡ ὑπὸ ΔΗΖ γωνία τῇ ὑπὸ ΔΖΗ·	ΔHZ açısı, ΔZH açısına;
therefore [it] is greater,	μείζων ἄρα	dolayısıyla büyüktür
[namely] ΔZH than EHZ;	ἡ ὑπὸ ΔΖΗ τῆς ὑπὸ ΕΗΖ·	ΔZH, EHZ açısından;
therefore [it] is much greater,	πολλῷ ἄρα μείζων ἐστὶν	dolayısıyla çok daha büyüktür
[namely] EZH than EHZ.	ἡ ὑπὸ ΕΖΗ τῆς ὑπὸ ΕΗΖ.	EZH, EHZ açısından.
And since there is a triangle, EZH,	καὶ ἐπεὶ τρίγωνόν ἐστι τὸ ΕΖΗ	Ve EZH bir üçgen olduğundan,

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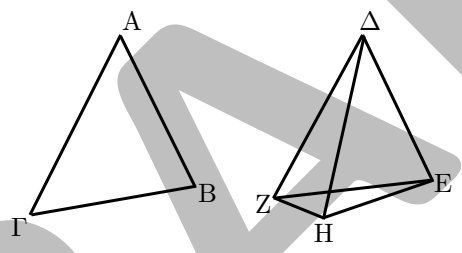
having greater	μείζονα ἔχον	büyük olan
angle EZH than EHZ,	τὴν ὑπὸ EZH γωνίαν τῆς ὑπὸ EHZ,	EZH açısı EHZ açısından,
and the greater angle,	ὑπὸ δὲ τὴν μείζονα γωνίαν	ve daha büyük açı,
—the greater side subtends it;	ἡ μείζων πλευρὰ ὑποτείνει,	—daha büyük açı tarafından karşılandığından;
greater therefore 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.

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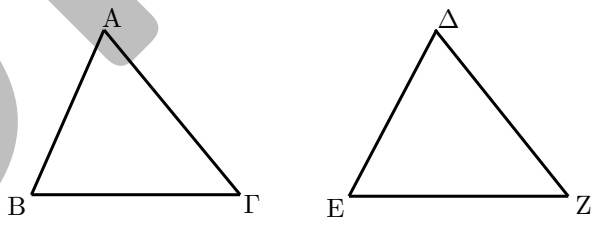
I say that	λέγω, ὅτι	İddia ediyorum ki
also the angle ΒΑΓ	καὶ γωνία ἡ ὑπὸ ΒΑΓ	ΒΑΓ açısı da
than the angle ΕΔΖ	γωνίας τῆς ὑπὸ ΕΔΖ	ΕΔΖ açısından
is greater.	μείζων ἐστίν.	büyüktür.
For if not,	Εἰ γὰρ μή,	Çünkü eğer değilse,
[it] is either equal to it, or less;	ἤτοι ἴση ἐστὶν αὐτῇ ἢ ἐλάσσων·	ya ona eşittir, 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·	
therefore it is not less,	οὐκ ἄρα ἐλάσσων ἐστὶν	ama değil;
ΒΑΓ than angle ΕΔΖ.	ἡ ὑπὸ ΒΑΓ γωνία τῆς ὑπὸ ΕΔΖ.	dolayısıyla küçük değildir,
And it was shown that	ἐδείχθη δέ, ὅτι	ΒΑΓ, ΕΔΖ açısından.
it is not equal;	οὐδὲ ἴση·	Ama gösterilmişti ki
therefore it is greater,	μείζων ἄρα ἐστὶν	eşit değildir;
ΒΑΓ than ΕΔΖ.	ἡ ὑπὸ ΒΑΓ τῆς ὑπὸ ΕΔΖ.	dolayısıyla büyüktür,
		ΒΑΓ, ΕΔΖ açısından.
If, therefore, two triangles	Ἐὰν ἄρα δύο τρίγωνα	Eğer, dolayısıyla, iki üçgenin
two sides	τὰς δύο πλευρὰς	(birinin) iki kenarı
to two sides	δυσὶ πλευραῖς	(diğerinin) iki kenarına
have equal,	ἴσας ἔχῃ	eşitse
either to either,	ἑκατέραν ἑκάτερᾳ,	her biri birine,
but base	τὴν δὲ βασίν	ama tabanı
than base	τῆς βάσεως	tabanından
have greater,	μείζονα ἔχῃ,	büyükse,
also angle	καὶ τὴν γωνίαν	açısı da
than angle	τῆς γωνίας	açısından
they will have greater	μείζονα ἕξει	büyük olacak
—that by the equal STRAIGHTS	τὴν ὑπὸ τῶν ἴσων εὐθειῶν	—(yani) eşit doğrularca
contained	περιεχομένην·	içerilenler;
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	— gösterilmesi gereken tam buydu.



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

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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	AB, 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,	AB, ΔΕ kenarına,
one of them is greater.	μία αὐτῶν μείζων ἐστίν.	biri daha büyüktür.
Let be greater	ἔστω μείζων	Büyük olan
ΑΒ,	ἡ ΑΒ,	AB olsun,
and let there be cut	καὶ κείσθω	ve kesilmiş olsun
to ΔΕ equal	τῇ ΔΕ ἴση	ΔΕ kenarina eşit
ΒΗ,	ἡ ΒΗ,	BH,
and suppose there has been joined	καὶ ἐπεζεύχθω	ve birleştirilmiş olsun
ΗΓ.	ἡ ΗΓ.	HΓ.
Because then it is equal,	Ἐπεὶ οὖν ἴση ἐστὶν	Çünkü o zaman eşittit,
ΒΗ to ΔΕ,	ἡ μὲν ΒΗ τῇ ΔΕ,	BH, 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	BH ve ΒΓ ikilisi
to the two ΔΕ and ΕΖ	δυσὶ ταῖς ΔΕ, ΕΖ	ΔΕ ve EZ ikilisine
are equal,	ἴσαι εἰσὶν	eşittirler,
either to either,	ἑκατέρα ἑκατέρᾳ·	her biri birine,
and the angle ΗΒΓ	καὶ γωνία ἡ ὑπὸ ΗΒΓ	ve HBΓ 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 HΓ tabanı
to the base ΔΖ	βάσει τῇ ΔΖ	ΔΖ tabanına
is equal,	ἴση ἐστίν,	eşittir,
and the triangle ΗΒΓ	καὶ τὸ ΗΒΓ τρίγωνον	ve HBΓ 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,

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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,
AB to ΔΕ.	ἡ ΑΒ τῇ ΔΕ.	AB, 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 AB and ΒΓ	δύο δὴ αἱ ΑΒ, ΒΓ	o zaman AB 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 AB to ΔΕ;	ὡς ἡ ΑΒ τῇ ΔΕ·	AB, 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 HB, for parallelism with ΔΕ. But HB and BH are the same line, and for all we know, Euclid preferred to write BH because it was in alphabetical order. Netz [12, Ch. 2] studies the general Greek mathematical practice of using the letters in different order for the same mathematical object. He concludes that changes in order are made on purpose, though he does not address examples like the present one.

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and AB to ΔE,	ἡ δὲ ΑΒ τῇ ΔΕ,	ve AB, ΔE kenarına
then the two AB and BΘ	δύο δὴ αἱ ΑΒ, ΒΘ	AB ve BΘ ikilisi
to the two ΔE and EZ	δυσὶ ταῖς ΔΕ, ΕΖ	ΔE ve EZ ikilisine
are equal,	ἴσαι εἰσὶν	eşittirler,
either to either;	ἑκατέρα ἑκατέρᾳ·	her biri birine;
and they contain equal angles;	καὶ γωνίας ἴσας περιέχουσιν·	ama içerirler eşit açıları;
therefore the base AΘ	βάσις ἄρα ἡ ΑΘ	dolayısıyla AΘ tabanı
to the base ΔZ	βάσει τῇ ΔΖ	ΔZ tabanına
is equal,	ἴση ἐστίν,	eşittir,
and the triangle ABΘ	καὶ τὸ ΑΒΘ τρίγωνον	ve ABΘ üçgeni
to the triangle ΔEZ	τῷ ΔΕΖ τριγώνῳ	ΔEZ 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 BΘA	ἡ ὑπὸ ΒΘΑ γωνία	BΘA,
to EZΔ.	τῇ ὑπὸ ΕΖΔ.	EZΔ açısına.
But EZΔ	ἀλλὰ ἡ ὑπὸ ΕΖΔ	Ama EZΔ,
to BΓA	τῇ ὑπὸ ΒΓΑ	BΓA açısına
is equal;	ἐστιν ἴση·	eşittir;
then of triangle AΘΓ	τριγώνου δὴ τοῦ ΑΘΓ	o zaman AΘΓ üçgeninin
the exterior angle BΘA	ἡ ἐκτὸς γωνία ἡ ὑπὸ ΒΘΑ	BΘA dış açısı
is equal	ἴση ἐστὶ	eşittir
to the interior and opposite	τῇ ἐντὸς καὶ ἀπεναντίον	iç ve karşıt
BΓA;	τῇ ὑπὸ ΒΓΑ·	BΓA açısına;
which is impossible.	ὅπερ ἀδύνατον.	ki bu imkansızdır.
Therefore it is not unequal,	οὐκ ἄρα ἄνισός ἐστιν	Dolayısıyla eşit değil değildir,
BΓ to EZ;	ἡ ΒΓ τῇ ΕΖ·	BΓ, EZ kenarına;
therefore it is equal.	ἴση ἄρα.	dolayısıyla eşittir.
And it is also,	ἐστὶ δὲ καὶ	Ve yine
AB,	ἡ ΑΒ	AB,
to ΔE,	τῇ ΔΕ	ΔE kenarına,
equal.	ἴση.	eşittir.
Then the two AB and BΓ	δύο δὴ αἱ ΑΒ, ΒΓ	O zaman AB ve BΓ ikilisi
to the two ΔE and EZ	δύο ταῖς ΔΕ, ΕΖ	ΔE ve EZ 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 AΓ	βάσις ἄρα ἡ ΑΓ	dolayısıyla AΓ tabanı
to the base ΔZ	βάσει τῇ ΔΖ	ΔZ tabanına
is equal,	ἴση ἐστίν,	eşittir,
and triangle ABΓ	καὶ τὸ ΑΒΓ τρίγωνον	ve ABΓ üçgeni
to triangle ΔEZ	τῷ ΔΕΖ τριγώνῳ	ΔEZ üçgenine
is equal,	ἴσον	eşittir,
and the remaining angle BAΓ	καὶ λοιπὴ γωνία ἡ ὑπὸ ΒΑΓ	ve kalan BAΓ açısı
to the remaining angle EΔZ	τῇ λοιπῇ γωνίᾳ τῇ ὑπὸ ΕΔΖ	kalan EΔZ 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;

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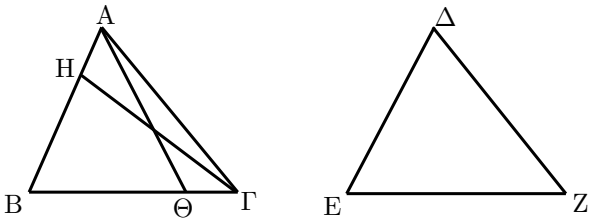
also the remaining sides	καὶ τὰς λοιπὰς πλευρὰς	kalan kenarları da
to the remaining sides	ταῖς λοιπαῖς πλευραῖς	kalan kenarlarına
they will have equal,	ἴσας ἕξει	eşit olacak,
also the remaining angle	καὶ τὴν λοιπὴν γωνίαν	kalan açıları da
to the remaining angle;	τῇ λοιπῇ γωνίᾳ·	kalan açılarına;
—just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

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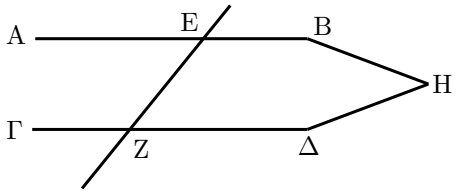
paraleldir AB, ΓΔ doğrusuna.

If therefore on two straights
a straight falling
the alternate angles
equal to one another
make,
parallel will be to one another
the straights;
—just what it was necessary to show.

Ἐὰν ἄρα εἰς δύο εὐθείας
εὐθεῖα ἐμπίπτουσα
τὰς ἐναλλὰξ γωνίας
ἴσας ἀλλήλαις
ποιῇ,
παράλληλοι ἔσονται
αἱ εὐθεῖαι·
ὅπερ ἔδει δεῖξαι.

Eğer, dolayısıyla, iki doğru üzerine
düşen bir doğrunun
yaptığı ters açılar
birbirine eşitse
birbirine paralel olacak
doğrular;
— gösterilmesi gereken tam buydu.



3.28

If on two straights
a straight falling[1]
the exterior angle
to the interior and opposite
and in the same parts
make equal,
or the interior and in the same parts
to two rights
equal,
parallel will be to one another
the straights.

Ἐὰν εἰς δύο εὐθείας
εὐθεῖα ἐμπίπτουσα
τὴν ἐκτὸς γωνίαν
τῇ ἐντὸς καὶ ἀπεναντίον
καὶ ἐπὶ τὰ αὐτὰ μέρη
ἴσην ποιῇ
ἢ τὰς ἐντὸς καὶ ἐπὶ τὰ αὐτὰ μέρη
δυσὶν ὀρθαῖς
ἴσας,
παράλληλοι ἔσονται ἀλλήλαις
αἱ εὐθεῖαι.

Eğer iki doğru üzerine
düşen bir doğru,
dış açıyı,
iç ve karşıt
ve aynı tarafta kalan açıya,
eşit yaparsa,
veya iç ve aynı tarafta kalanları,
iki dik açıya
eşit,
birbirine paralel olacak
doğrular.

For, on the two straights AB and ΓΔ,
the straight falling—EZ—
the exterior angle EHB
to the interior and opposite angle
HΘΔ
equal
—suppose it makes,
or the interior and in the same parts,
BHΘ and HΘΔ,
to two rights
equal.

Εἰς γὰρ δύο εὐθείας τὰς AB, ΓΔ
εὐθεῖα ἐμπίπτουσα ἡ EZ
τὴν ἐκτὸς γωνίαν τὴν ὑπὸ EHB
τῇ ἐντὸς καὶ ἀπεναντίον γωνίᾳ
τῇ ὑπὸ HΘΔ
ἴσην
ποιείτω
ἢ τὰς ἐντὸς καὶ ἐπὶ τὰ αὐτὰ μέρη
τὰς ὑπὸ BHΘ, HΘΔ
δυσὶν ὀρθαῖς
ἴσας·

Çünkü, AB ve ΓΔ doğruları üzerine
düşen EZ doğrusu
EHB dış açısını
iç ve karşıt
HΘΔ açısına
eşit
—yaptığı varsayılsın,
veya iç ve aynı tarafta kalan,
BHΘ ve HΘΔ açılarının,
iki dik açıya
equal.

I say that
parallel is
AB to ΓΔ.

λέγω, ὅτι
παράλληλός ἐστιν
ἡ AB τῇ ΓΔ.

İddia ediyorum ki
paraleldir
AB, ΓΔ doğrusuna.

For, since equal is
EHB to HΘΔ,
while EHB to AHΘ
is equal,
therefore also AHΘ to HΘΔ
is equal;
and they are alternate;
parallel therefore is AB to ΓΔ.

Ἐπεὶ γὰρ ἴση ἐστὶν
ἡ ὑπὸ EHB τῇ ὑπὸ HΘΔ,
ἀλλὰ ἡ ὑπὸ EHB τῇ ὑπὸ AHΘ
ἐστιν ἴση,
καὶ ἡ ὑπὸ AHΘ ἄρα τῇ ὑπὸ HΘΔ
ἐστιν ἴση·
καί εἰσιν ἐναλλάξ·
παράλληλος ἄρα ἐστὶν ἡ AB τῇ ΓΔ.

Çünkü, eşit olduğundan
EHB, HΘΔ açısına,
aynı zamanda EHB, AHΘ açısına
eşitken,
dolayısıyla AHΘ de HΘΔ açısına
eşittir;
ve terstirler;
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.

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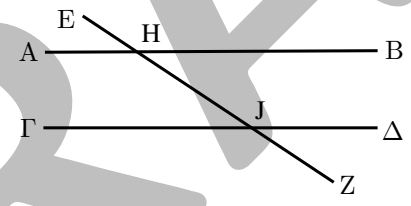
Alternatively, since BHΘ and HΘΔ	Πάλιν, ἐπεὶ αἱ ὑπὸ BHΘ, HΘΔ	Ya da BHΘ ve HΘΔ,
to two RIGHTS	δύο ὀρθαῖς	iki dik açıya
are equal,	ἴσαι εἰσίν,	eşittirr,
and also are AHΘ and BHΘ	εἰσὶ δὲ καὶ αἱ ὑπὸ AHΘ, BHΘ	ve AHΘ ve BHΘ de
to two RIGHTS	δυσὶν ὀρθαῖς	iki dik açıya
equal,	ἴσαι,	eşittir,
therefore AHΘ and BHΘ	αἱ ἄρα ὑπὸ AHΘ, BHΘ	dolayısıyla AHΘ ve BHΘ,
to BHΘ and HΘΔ	ταῖς ὑπὸ BHΘ, HΘΔ	BHΘ ve HΘΔ açılarına
are equal;	ἴσαι εἰσίν·	eşittirle;
suppose the common has been taken away	κοινὴ ἀφῃρήσθω	varsayılsın çıkartılmış olduğu ortak olan
—BHΘ;	ἡ ὑπὸ BHΘ·	BHΘ açısının;
therefore the remaining AHΘ	λοιπὴ ἄρα ἡ ὑπὸ AHΘ	dolayısıyla AHΘ kalanı
to the remaining HΘΔ	λοιπῇ τῇ ὑπὸ HΘΔ	HΘΔ kalanına
is equal;	ἐστιν ἴση·	eşittir
also they are alternate;	καί εἰσιν ἐναλλάξ·	ve bunlar terstirler;
parallel therefore are AB and ΓΔ.	παράλληλος ἄρα ἐστὶν ἡ AB τῇ ΓΔ.	paraleldir dolayısıyla AB 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
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	buydu.



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
AB and ΓΔ	τὰς AB, ΓΔ	AB ve ΓΔ doğruları üzerine
let the STRAIGHT EZ fall.	εὐθεῖα ἐμπιπτέτω ἡ EZ·	EZ doğrusu düşsün.
I say that	λέγω, ὅτι	İddia ediyorum ki
the alternate angles	τὰς ἐναλλὰξ γωνίας	ters
AHΘ and HΘΔ	τὰς ὑπὸ AHΘ, HΘΔ	AHΘ ve HΘΔ açılarını
equal	ἴσας	eşit
it makes,	ποιεῖ	yapar,
and the exterior angle EHΓ	καὶ τὴν ἐκτὸς γωνίαν τὴν ὑπὸ EHB	ve EHΓ dış açısını

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to the interior and opposite ΗΘΔ
equal,
and the interior and in the same parts
ΒΗΘ and ΗΘΔ
to two RIGHTs equal.

For, if it is unequal,
ΑΗΘ to ΗΘΔ,
one of them is greater.
Let the greater be ΑΗΘ;
let be added in common
ΒΗΘ;
therefore ΑΗΘ and ΒΗΘ
than ΒΗΘ and ΗΘΔ
are greater.
However, ΑΗΘ and ΒΗΘ
to two RIGHTs
equal are.
Therefore [also] ΒΗΘ and ΗΘΔ
than two RIGHTs
less are.
And [STRAIGHTs] from [angles] that are less
than two RIGHTs,
extended to the infinite,
fall together.
Therefore ΑΒ and ΓΔ,
extended to the infinite,
will fall together.
But they do not fall together,
by their being assumed parallel.
Therefore is not unequal
ΑΗΘ to ΗΘΔ.
Therefore it is equal.
However, ΑΗΘ to ΕΗΒ
is equal;
therefore also ΕΗΒ to ΗΘΔ
is equal;
let ΒΗΘ be added in common;
therefore ΕΗΒ and ΒΗΘ
to ΒΗΘ and ΗΘΔ
is equal.
But ΕΗΒ and ΒΗΘ
to two RIGHTs
are equal.
Therefore also ΒΗΘ and ΗΘΔ
to two RIGHTs
are equal.

Therefore the on-parallel-STRAIGHTs STRAIGHT falling
the alternate angles
makes equal to one another,
and the exterior
to the interior and opposite
equal,
and the interior and in the same parts
to two RIGHTs equal;
—just what it was necessary to show.

τῇ ἐντὸς καὶ ἀπεναντίον τῇ ὑπὸ ΗΘΔ
ἴσην
καὶ τὰς ἐντὸς καὶ ἐπὶ τὰ αὐτὰ μέρη
τὰς ὑπὸ ΒΗΘ, ΗΘΔ
δυσὶν ὀρθαῖς ἴσας.

Εἰ γὰρ ἄνισός ἐστιν
ἡ ὑπὸ ΑΗΘ τῇ ὑπὸ ΗΘΔ,
μία αὐτῶν μείζων ἐστίν.
ἔστω μείζων ἡ ὑπὸ ΑΗΘ·
κοινὴ προσκείσθω
ἡ ὑπὸ ΒΗΘ·
αἱ ἄρα ὑπὸ ΑΗΘ, ΒΗΘ
τῶν ὑπὸ ΒΗΘ, ΗΘΔ
μείζονές εἰσιν.
ἀλλὰ αἱ ὑπὸ ΑΗΘ, ΒΗΘ
δυσὶν ὀρθαῖς
ἴσαι εἰσίν.
[καὶ] αἱ ἄρα ὑπὸ ΒΗΘ, ΗΘΔ
δύο ὀρθῶν
ἐλάσσονές εἰσιν.
αἱ δὲ ἀπ' ἐλασσόνων
ἢ δύο ὀρθῶν
ἐκβαλλόμεναι
εἰς ἄπειρον
συμπίπτουσιν·
αἱ ἄρα ΑΒ, ΓΔ
ἐκβαλλόμεναι εἰς ἄπειρον
συμπεσοῦνται·
οὐ συμπίπτουσι δὲ
διὰ τὸ παραλλήλους αὐτὰς ὑποκεῖσθαι·
οὐκ ἄρα ἄνισός ἐστιν
ἡ ὑπὸ ΑΗΘ τῇ ὑπὸ ΗΘΔ·
ἴση ἄρα.
ἀλλὰ ἡ ὑπὸ ΑΗΘ τῇ ὑπὸ ΕΗΒ
ἐστιν ἴση·
καὶ ἡ ὑπὸ ΕΗΒ ἄρα τῇ ὑπὸ ΗΘΔ
ἐστιν ἴση·
κοινὴ προσκείσθω ἡ ὑπὸ ΒΗΘ·
αἱ ἄρα ὑπὸ ΕΗΒ, ΒΗΘ
ταῖς ὑπὸ ΒΗΘ, ΗΘΔ
ἴσαι εἰσίν.
ἀλλὰ αἱ ὑπὸ ΕΗΒ, ΒΗΘ
δύο ὀρθαῖς
ἴσαι εἰσίν·
καὶ αἱ ὑπὸ ΒΗΘ, ΗΘΔ ἄρα
δύο ὀρθαῖς
ἴσαι εἰσίν.

Ἡ ἄρα εἰς τὰς παραλλήλους εὐθείας εὐθεῖα
ἐμπίπτουσα
τάς τε ἐναλλὰξ γωνίας
ἴσας ἀλλήλαις ποιεῖ
καὶ τὴν ἐκτὸς
τῇ ἐντὸς καὶ ἀπεναντίον
ἴσην
καὶ τὰς ἐντὸς καὶ ἐπὶ τὰ αὐτὰ μέρη
δυσὶν ὀρθαῖς ἴσας·
ὅπερ ἔδει δεῖξαι.

iç ve karşıt ΗΘΔ açısına
eşit,
ve iç ve aynı taraftaki
ΒΗΘ ile ΗΘΔ açılarını
iki dik açıya eşit.

Çünkü, eğer eşit değilse
ΑΗΘ, ΗΘΔ açısına,
biri büyüktür.
Büyük olan ΑΗΘ olsun;
eklenmiş olsun her ikisine de
ΒΗΘ;
dolayısıyla ΑΗΘ ve ΒΗΘ,
ΒΗΘ ve ΗΘΔ açılarından
büyüktürler.
Fakat, ΑΗΘ ve ΒΗΘ
iki dik açıya
eşittirler.
Dolayısıyla ΒΗΘ ve ΗΘΔ [da]
iki dik açıdan
küçüktürler.
Ve küçük olanlardan,
iki dik açıdan,
sonsuza uzatılanlar [doğrular],
birbirinin üzerine düşerler.
Dolayısıyla ΑΒ ve ΓΔ,
uzatılınca sonsuza,
birbirinin üzerine düşecekler.
Ama onlar birbirinin üzerine düşmezler,
paralel oldukları kabul edildiğinden.
Dolayısıyla eşit değil değildir
ΑΗΘ, ΗΘΔ açısına.
Dolayısıyla eşittir.
Ancak, ΑΗΘ, ΕΗΒ açısına
eşittir;
dolayısıyla ΕΗΒ da ΗΘΔ açısına
eşittir;
eklenmiş olsun her ikisine de ΒΗΘ;
dolayısıyla ΕΗΒ ve ΒΗΘ,
ΒΗΘ ve ΗΘΔ açılarına
eşittir.
Ama ΕΗΒ ve ΒΗΘ
iki dik açıya
eşittirler.
Dolayısıyla ΒΗΘ ve ΗΘΔ da
iki dik açıya
eşittirler.

Dolayısıyla paralel doğrular üzerine, doğru
düşerken
ters açıları
eşit yapar birbirine,
ve dış açıyı
iç ve karşıta
eşit,
ve iç ve aynı taraftakileri s
iki dik açıya eşit;
— gösterilmesi gereken tam buydu.

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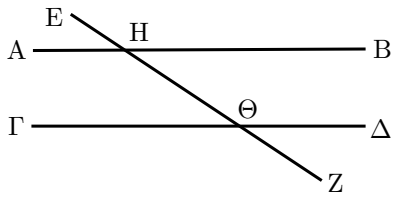

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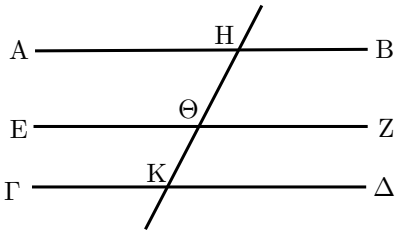
[Straights] to the same straight parallel also to one another are parallel.	Αἱ τῇ αὐτῇ εὐθείᾳ παράλληλοι καὶ ἀλλήλαις εἰσὶ παράλληλοι.	Aynı doğruya paralel doğrular birbirlerine de paraleldir.
Let be either of AB and ΓΔ to ΓΔ parallel.	Ἔστω ἑκατέρα τῶν AB, ΓΔ τῇ EZ παράλληλος·	Olsun AB ve ΓΔ doğrularının 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

DRAFT

a straight line to draw.

εὐθεῖαν γραμμὴν ἀγαγεῖν.

bir doğru çizmek.

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

Ἔστω
τὸ μὲν δοθὲν σημεῖον τὸ A,
ἡ δὲ δοθεῖσα εὐθεῖα ἡ BΓ·

Olsun
verilen nokta A,
ve verilen doğru BΓ.

It is necessary then
through the point A
to the STRAIGHTBΓ parallel
a straight line to draw.

δεῖ δὴ
διὰ τοῦ A σημείου
τῇ BΓ εὐθείᾳ παράλληλον
εὐθεῖαν γραμμὴν ἀγαγεῖν.

Şimdi gereklidir
A noktasından
BΓ doğrusuna paralel
bir doğru çizmek.

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

Εἰλήφθω
ἐπὶ τῆς BΓ
τυχὸν σημεῖον τὸ Δ,
καὶ ἐπεζεύχθω ἡ AΔ·
καὶ συνεστάτω
πρὸς τῇ ΔA εὐθείᾳ
καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ A
τῇ ὑπὸ AΔΓ γωνίᾳ ἴση
ἡ ὑπὸ ΔAE·
καὶ ἐκβεβλήσθω
ἐπ᾽ εὐθείας τῇ EA
εὐθεῖα ἡ AZ.

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

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

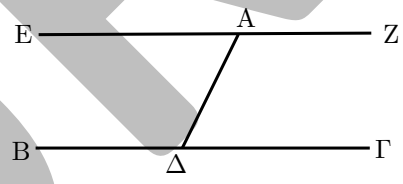
Καὶ ἐπεὶ
εἰς δύο εὐθείας τὰς BΓ, EZ
εὐθεῖα ἐμπίπτουσα ἡ AΔ
τὰς ἐναλλὰξ γωνίας
τὰς ὑπὸ EAΔ, AΔΓ
ἴσας ἀλλήλαις πεποίηκεν,
παράλληλος ἄρα ἐστὶν ἡ EAZ τῇ BΓ.

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

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

Διὰ τοῦ δοθέντος ἄρα σημείου τοῦ A
τῇ δοθείσῃ εὐθείᾳ τῇ BΓ παράλληλος
εὐθεῖα γραμμὴ ἦκται ἡ EAZ·
ὅπερ ἔδει ποιῆσαι.

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



3·32

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

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

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

DRAFT

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.

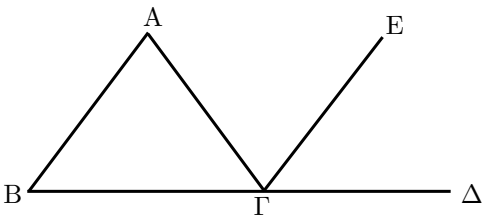
Κοινὴ προσκείσθω ἡ ὑπὸ ΑΓΒ·
αἱ ἄρα ὑπὸ ΑΓΔ, ΑΓΒ
τρισὶ ταῖς ὑπὸ ΑΒΓ, ΒΓΑ, ΓΑΒ
ἴσαι εἰσίν.
ἀλλ᾽ αἱ ὑπὸ ΑΓΔ, ΑΓΒ
δυσὶν ὀρθαῖς ἴσαι εἰσίν·
καὶ αἱ ὑπὸ ΑΓΒ, ΓΒΑ, ΓΑΒ ἄρα
δυσὶν ὀρθαῖς ἴσαι εἰσίν.

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.



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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 ΑΒ, ΓΔ, καὶ ἐπιζευγνύτωσαν αὐτὰς ἐπὶ τὰ αὐτὰ μέρη εὐθεῖαι αἱ ΑΓ, ΒΔ·	Olsun eşit ve paraleller AB ve ΓΔ, ve bunların birleştirsin aynı taraflarını AΓ ve BΔ doğruları.
I say that also AΓ and BΔ equal and parallel are.	λέγω, ὅτι καὶ αἱ ΑΓ, ΒΔ 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 ΒΓ. καὶ ἐπεὶ παράλληλός ἐστιν ἡ ΑΒ τῇ ΓΔ, καὶ εἰς αὐτὰς ἐμπέπτωκεν ἡ ΒΓ, αἱ ἐναλλὰξ γωνίαι αἱ ὑπὸ ΑΒΓ, ΒΓΔ ἴσαι ἀλλήλαις εἰσίν. καὶ ἐπεὶ ἴση ἐστὶν ἡ ΑΒ τῇ ΓΔ κοινὴ δὲ ἡ ΒΓ, δύο δὴ αἱ ΑΒ, ΒΓ δύο ταῖς ΒΓ, ΓΔ ἴσαι εἰσίν· καὶ γωνία ἡ ὑπὸ ΑΒΓ γωνίᾳ τῇ ὑπὸ ΒΓΔ ἴση· βάσις ἄρα ἡ ΑΓ βάσει τῇ ΒΔ ἐστιν ἴση, καὶ τὸ ΑΒΓ τρίγωνον τῷ ΒΓΔ τριγώνῳ ἴσον ἐστίν, καὶ αἱ λοιπαὶ γωνίαι ταῖς λοιπαῖς γωνίαις ἴσαι ἔσονται ἑκατέρα ἑκατέρᾳ, ὑφ᾽ ἃς αἱ ἴσαι πλευραὶ ὑποτείνουσιν· ἴση ἄρα ἡ ὑπὸ ΑΓΒ γωνία τῇ ὑπὸ ΓΒΔ. καὶ ἐπεὶ εἰς δύο εὐθείας τὰς ΑΓ, ΒΔ εὐθεῖα ἐμπίπτουσα ἡ ΒΓ τὰς ἐναλλὰξ γωνίας ἴσας ἀλλήλαις πεποίηκεν, παράλληλος ἄρα ἐστὶν ἡ ΑΓ τῇ ΒΔ. ἐδείχθη δὲ αὐτῇ καὶ ἴση.	Varsayılsın birleştirilmiş olduğu 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.

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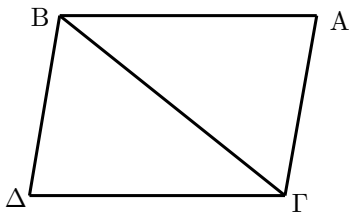
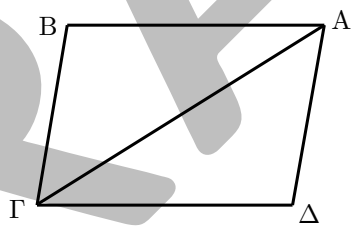


3·34

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,

DRAFT

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.



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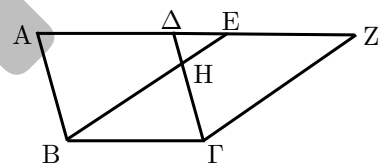
Parallelograms	Τὰ παραλληλόγραμμα	Paralelkenarlar;
on the same base being	τὰ ἐπὶ τῆς αὐτῆς βάσεως ὄντα	aynı tabanda olan
and in the same parallels	καὶ ἐν ταῖς αὐταῖς παραλλήλοις	ve aynı paralellerde olanlar,
equal to one another are.	ἴσα ἀλλήλοις ἐστίν.	birbirlerine eşittir.
Let there be	Ἔστω	Verilmiş 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,

DRAFT

equal is AΔ to BΓ.	ἴση ἐστὶν ἡ ΑΔ τῇ ΒΓ.	eşittir AΔ, BΓ kenarına.
Similarly then also,	διὰ τὰ αὐτὰ δὴ καὶ	Benzer şekilde o zaman,
EZ to BΓ is equal;	ἡ ΕΖ τῇ ΒΓ ἐστιν ἴση·	EZ, BΓ kenarına eşittir;
so that also AΔ to EZ is equal;	ὥστε καὶ ἡ ΑΔ τῇ ΕΖ ἐστιν ἴση·	böylece AΔ da EZ kenarına eşittir;
and common [is] ΔE;	καὶ κοινὴ ἡ ΔΕ·	ve ortaktır ΔE;
therefore AE, as a whole,	ὅλη ἄρα ἡ ΑΕ	dolayısıyla AE, bir bütün olarak,
to ΔZ, as a whole,	ὅλῃ τῇ ΔΖ	ΔZ kenarına
is equal.	ἐστιν ἴση.	eşittir.
Is also AB to ΔΓ equal.	ἔστι δὲ καὶ ἡ ΑΒ τῇ ΔΓ ἴση·	AB da ΔΓ kenarına eşittir.
Then the two EA and AB	δύο δὴ αἱ ΕΑ, ΑΒ	O zaman EA ve AB ikilisi
to the two ZΔ and ΔΓ	δύο ταῖς ΖΔ, ΔΓ	ZΔ ve ΔΓ ikilisine
equal are	ἴσαι εἰσὶν	eşittirler
either to either;	ἑκατέρα ἑκατέρᾳ·	her biri birine;
also angle ZΔΓ	καὶ γωνία ἡ ὑπὸ ΖΔΓ	ve ZΔΓ açısı da
to EAB	γωνίᾳ τῇ ὑπὸ ΕΑΒ	EAB açısına
is equal,	ἐστιν ἴση	eşittirl,
the exterior to the interior;	ἡ ἐκτὸς τῇ ἐντός·	dış açı, iç açıya;
therefore the base EB	βάσις ἄρα ἡ ΕΒ	dolayısıyla EB tabanı
to the base ZΓ	βάσει τῇ ΖΓ	ZΓ tabanına
is equal,	ἴση ἐστίν,	eşittir,
and triangle EAB	καὶ τὸ ΕΑΒ τρίγωνον	ve EAB üçgeni
to triangle ΔZΓ	τῷ ΔΖΓ τριγώνῳ	ΔZΓ üçgenine
equal will be;	ἴσον ἔσται·	eşit olacak;
suppose has been removed, commonly,	κοινὸν ἀφῃρήσθω τὸ ΔΗΕ·	kaldırılmış olsun, ortak olarak,
ΔHE;	λοιπὸν ἄρα τὸ ΑΒΗΔ τραπέζιον	ΔHE;
therefore the trapezium ABHΔ that remains	λοιπῷ τῷ ΕΗΓΖ τραπεζίῳ	dolayısıyla kalan ABHΔ yamuğu
	ἐστὶν ἴσον·	kalan EHΓZ yamuğuna
to the trapezium EHΓZ that remains	κοινὸν προσκείσθω τὸ ΗΒΓ τρίγωνον·	eşittir;
is equal;	ὅλον ἄρα τὸ ΑΒΓΔ παραλληλόγραμμον	eklenmiş olsun her ikisine birden
let be added in common	ὅλῳ τῷ ΕΒΓΖ παραλληλογράμμῳ	HBΓ üçgeni;
the triangle HBΓ;	ἴσον ἐστίν.	dolayısıyla ABΓΔ yamuğunun tamamı
therefore the trapezium ABΓΔ as a whole		EBΓZ yamuğunun tamamına
to the trapezium EBΓZ as a whole		eşittir.
is equal.		
Therefore parallelograms	Τὰ ἄρα παραλληλόγραμμα	Dolayısıyla 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;
—just what it was necessary to show.	ὅπερ ἔδει δεῖξαι.	— gösterilmesi gereken tam buydu.



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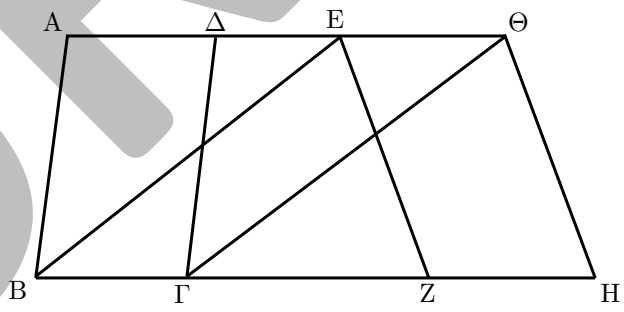
Parallelograms	Τὰ παραλληλόγραμμα	Paralelkenarlar;
that are on equal bases	τὰ ἐπὶ ἴσων βάσεων ὄντα	eşit tabanlarda olanlar
and in the same parallels	καὶ ἐν ταῖς αὐταῖς παραλλήλοις	ve aynı paralellerde olanlar
are equal to one another.	ἴσα ἀλλήλοις ἐστίν.	eşittirler birbirlerine.
Let there be	Ἔστω	Verilmiş olsun
parallelograms	παραλληλόγραμμα	paralelkenarlar
ABΓΔ and EZHΘ	τὰ ΑΒΓΔ, ΕΖΗΘ	ABΓΔ veEZHΘ
on equal bases,	ἐπὶ ἴσων βάσεων ὄντα	eşit
BΓ and ZH,	τῶν ΒΓ, ΖΗ	BΓ ve ZH tabanlarında,
and in the same parallels,	καὶ ἐν ταῖς αὐταῖς παραλλήλοις	ve aynı
AΘ and BH.	ταῖς ΑΘ, ΒΗ·	AΘ ve BH paralellerinde.

DRAFT

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



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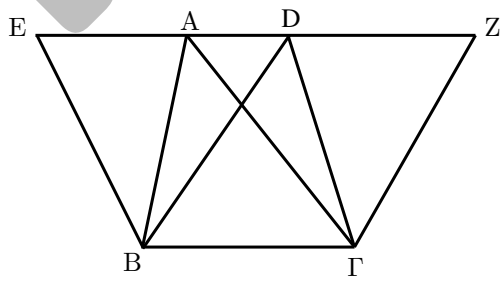
Triangles that are on the same base and in the same parallels are equal to one another.	Τὰ τρίγωνα τὰ ἐπὶ τῆς αὐτῆς βάσεως ὄντα καὶ ἐν ταῖς αὐταῖς παραλλήλοις ἴσα ἀλλήλοις ἐστίν.	Üçgenler; aynı tabanda ve aynı paralellerde olanlar, eşittir birbirlerine.
Let there be triangles ΑΒΓ and ΔΒΓ, on the same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

DRAFT

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 E and Z,	ἡ ΑΔ ἐφ᾽ ἑκάτερα τὰ μέρη ἐπὶ τὰ Ε, Ζ,	ΑΔ doğrusunun her iki kenarda E ve Z 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.



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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.	ἴσα ἀλλήλοις ἐστίν.	eşittir birbirlerine.
Let there be	Ἔστω	Verilmiş olsun
triangles ΑΒΓ and ΔΕΖ	τρίγωνα τὰ ΑΒΓ, ΔΕΖ	ΑΒΓ ve ΔΕΖ üçgenleri

DRAFT

on equal bases BΓ and EZ
and in the same parallels
BZ and AΔ.

ἐπὶ ἴσων βάσεων τῶν BΓ, EZ
καὶ ἐν ταῖς αὐταῖς παραλλήλοις
ταῖς BZ, AΔ·

eşit BΓ ve EZ tabanlarında
ve aynı
BZ ve AΔ paralellerinde.

I say that
equal is
triangle ABΓ
to triangle ΔEZ.

λέγω, ὅτι
ἴσον ἐστὶ
τὸ ABΓ τρίγωνον
τῷ ΔEZ τριγώνῳ.

İddia ediyorum ki
eşittir
ABΓ üçgeni
ΔEZ üçgenine.

For, suppose has been extended
AΔ on both sides to H and Θ,
and through B,
parallel to ΓA,
has been drawn BH,
and through Z,
parallel to ΔE,
has been drawn ZΘ.

Ἐκβεβλήσθω γὰρ
ἡ AΔ ἐφ᾽ ἑκάτερα τὰ μέρη ἐπὶ τὰ H, Θ,
καὶ διὰ μὲν τοῦ B
τῇ ΓA παράλληλος
ἤχθω ἡ BH,
δὶα δὲ τοῦ Z
τῇ ΔE παράλληλος
ἤχθω ἡ ZΘ.

Çünkü varsayılsın uzatılmış olduğu
AΔ kenarının her iki kenarda H ve Θ noktalarına,
ve B noktasından,
ΓA kenarına paralel,
BH çizilmiş olsun,
ve Z noktasından,
ΔE kenarına paralel,
ZΘ çizilmiş olsun.

Therefore a parallelogram
is either of HBΓA and ΔEZΘ;
and HBΓA [is] equal to ΔEZΘ;
for they are on equal bases,
BΓ and EZ,
and in the same parallels,
BZ and HΘ;
and [it] is
of the parallelogram HBΓA
half
—the triangle ABΓ.
For the diameter AB cuts it in two;
and of the parallelogram ΔEZΘ
half
—the triangle ZEΔ;
for the diameter ΔZ cuts it in two.
[And halves of equals
are equal to one another.]
Therefore equal is
the triangle ABΓ to the triangle ΔEZ.

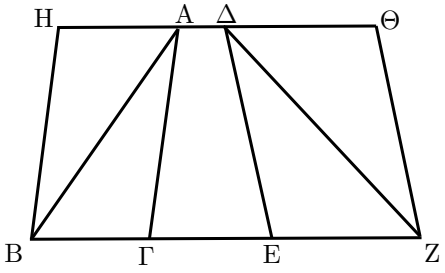
παραλληλόγραμμον ἄρα
ἐστὶν ἑκάτερον τῶν HBΓA, ΔEZΘ·
καὶ ἴσον τὸ HBΓA τῷ ΔEZΘ·
ἐπί τε γὰρ ἴσων βάσεών εἰσι
τῶν BΓ, EZ
καὶ ἐν ταῖς αὐταῖς παραλλήλοις
ταῖς BZ, HΘ·
καί ἐστι
τοῦ μὲν HBΓA παραλληλογράμμου
ἥμισυ
τὸ ABΓ τρίγωνον.
ἡ γὰρ AB διάμετρος αὐτὸ δίχα τέμνει·
τοῦ δὲ ΔEZΘ παραλληλογράμμου
ἥμισυ
τὸ ZEΔ τρίγωνον·
ἡ γὰρ ΔZ δίαμετρος αὐτὸ δίχα τέμνει
[τὰ δὲ τῶν ἴσων ἡμίση
ἴσα ἀλλήλοις ἐστίν].
ἴσον ἄρα ἐστὶ
τὸ ABΓ τρίγωνον τῷ ΔEZ τριγώνῳ.

Dolayısıyla birer paralelkenardır
HBΓA ile ΔEZΘ;
ve HBΓA eşittir ΔEZΘ paralelkenarına;
eşit,
BΓ ve EZ tabanlarında,
ve aynı,
BZ ve HΘ paralellerinde oldukları için;
ve
HBΓA paralelkenarının
yarısı
—ABΓ üçgenidir.
AB köşegeni onu ikiye kestiği için;
ve ΔEZΘ paralelkenarının
yarısı
— ZEΔ üçgenidir;
ΔZ köşegeni onu ikiye kestiği için.
[Ve eşitlerin yarıları
eşittirler birbirlerine.]
Dolayısıyla eşittir
ABΓ üçgeni ΔEZ 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.



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Equal triangles
that are on the same base

Τὰ ἴσα τρίγωνα
τὰ ἐπὶ τῆς αὐτῆς βάσεως ὄντα

Eşit üçgenler;
aynı tabanda

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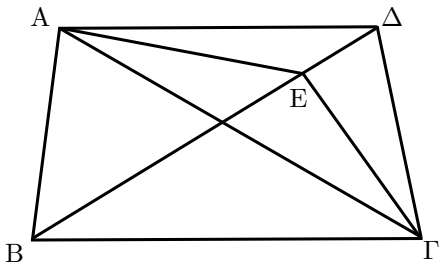
and in the same parts are also in the same parallels.	καὶ ἐπὶ τὰ αὐτὰ μέρη καὶ ἐν ταῖς αὐταῖς παραλλήλοις ἐστίν.	ve onun aynı tarafında olan, aynı paralellerdedirler de.
Let there be equal triangles ΑΒΓ and ΔΒΓ, being on the same base and on the same side of ΒΓ.	Ἔστω ἴσα τρίγωνα τὰ ΑΒΓ, ΔΒΓ ἐπὶ τῆς αὐτῆς 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,

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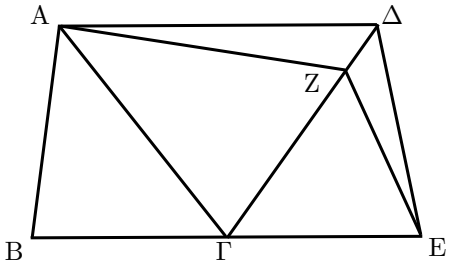
are also in the same parallels.	καὶ ἐν ταῖς αὐταῖς παραλλήλοις ἐστίν.	aynı paralelerdedirler de.
Let there be equal triangles ΑΒΓ and ΓΔΕ, on equal bases ΒΓ and ΓΕ, and in the same parts.	Ἔστω ἴσα τρίγωνα τὰ ΑΒΓ, ΓΔΕ ἐπὶ ἴσων βάσεων τῶν ΒΓ, ΓΕ καὶ ἐπὶ τὰ αὐτὰ μέρη.	Verilmiş olsun eşit ΑΒΓ ve ΓΔΕ üçgenleri,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



3·41

If a parallelogram have the same base as a triangle,	Ἐὰν παραλληλόγραμμον τριγώνῳ βάσιν τε ἔχῃ τὴν αὐτὴν	Eğer bir paralelkenar bir üçgenle aynı tabana sahipse,

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and be in the same parallels,
double is
the parallelogram of the triangle.

καὶ ἐν ταῖς αὐταῖς παραλλήλοις ᾖ,
διπλάσιόν ἐστί
τὸ παραλληλόγραμμον τοῦ τριγώνου.

ve aynı paralelerdeyse,
iki katıdır
paralelkenar, üçgenin.

For, the parallelogram ΑΒΓΔ
as the triangle ΕΒΓ,
—suppose it has the same base, ΒΓ,
and is in the same parallels,
ΒΓ and ΑΕ.

Παραλληλόγραμμον γὰρ τὸ ΑΒΓΔ
τριγώνῳ τῷ ΕΒΓ
βάσιν τε ἐχέτω τὴν αὐτὴν τὴν ΒΓ
καὶ ἐν ταῖς αὐταῖς παραλλήλοις ἔστω
ταῖς ΒΓ, ΑΕ·

Çünkü ΑΒΓΔ paralelkenarının
ΕΒΓ üçgeniyle,
—saynı ΒΓ tabanı olduğu varsayılsın,
ve aynı
ΒΓ ve ΑΕ paralelerinde oldukları.

I say that
double is
the parallelogram ΑΒΓΔ
of the triangle ΒΕΓ.

λέγω, ὅτι
διπλάσιόν ἐστι
τὸ ΑΒΓΔ παραλληλόγραμμον
τοῦ ΒΕΓ τριγώνου.

İddia ediyorum ki
iki katıdır
ΑΒΓΔ paralelkenarı
ΒΕΓ üçgeninin.

For, suppose ΑΓ has been joined.

Ἐπεζεύχθω γὰρ ἡ ΑΓ.

Çünkü, varsayılsın ΑΓ doğrusunun birleştirildiği.

Equal is the triangle ΑΒΓ
to the triangle ΕΒΓ;
for it is on the same base as it,
ΒΓ,
and in the same parallels,
ΒΓ and ΑΕ.
But the parallelogram ΑΒΓΔ
is double of the triangle ΑΒΓ;
for the diameter ΑΓ cuts it in two;
so that the parallelogram ΑΒΓΔ
also of the triangle ΕΒΓ is double.

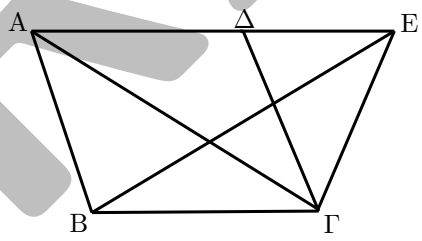
ἴσον δή ἐστι τὸ ΑΒΓ τρίγωνον
τῷ ΕΒΓ τριγώνῳ·
ἐπί τε γὰρ τῆς αὐτῆς βάσεώς ἐστιν αὐτῷ
τῆς ΒΓ
καὶ ἐν ταῖς αὐταῖς παραλλήλοις
ταῖς ΒΓ, ΑΕ.
ἀλλὰ τὸ ΑΒΓΔ παραλληλόγραμμον
διπλάσιόν ἐστι τοῦ ΑΒΓ τριγώνου·
ἡ γὰρ ΑΓ διάμετρος αὐτὸ δίχα τέμνει·
ὥστε τὸ ΑΒΓΔ παραλληλόγραμμον
καὶ τοῦ ΕΒΓ τριγώνου ἐστὶ διπλάσιον.

Eşittir ΑΒΓ üçgeni
ΕΒΓ üçgenine;
onunla aynı,
ΒΓ tabanına sahip,
ve aynı
ΒΓ ve ΑΕ paralelerinde olduğu için.
Fakat ΑΒΓΔ paralelkenarı
iki katıdır ΑΒΓ üçgeninin;
ΑΓ köşegeni onu ikiye kestiğinden;
böylece ΑΒΓΔ paralelkenarı da
grEBG üçgeninin iki katıdır.

Therefore, if a parallelogram
have the same base as a triangle,
and be in the same parallels,
double is
the parallelogram of the triangle;
—just what it was necessary to show.

Ἐὰν ἄρα παραλληλόγραμμον
τριγώνῳ βάσιν τε ἔχῃ τὴν αὐτὴν
καὶ ἐν ταῖς αὐταῖς παραλλήλοις ᾖ,
διπλάσιόν ἐστί
τὸ παραλληλόγραμμον τοῦ τριγώνου·
ὅπερ ἔδει δεῖξαι.

Dolayısıyla, eğer bir paralelkenar
bir üçgenle aynı tabana sahipse,
ve aynı paralelerdeyse,
iki katıdır
paralelkenar, üçgenin;
— gösterilmesi gereken tam buydu.



3.42

To the given triangle equal,
a parallelogram to construct
in the given rectilineal angle.

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

Verilen bir üçgene eşit,
bir paralelkenarı
verilen bir düzkenar açıda inşa etmek.

Let be
the given triangle ΑΒΓ,
and the given rectilineal angle, Δ.

Ἔστω
τὸ μὲν δοθὲν τρίγωνον τὸ ΑΒΓ,
ἡ δὲ δοθεῖσα γωνία εὐθύγραμμος ἡ Δ·

Verilen
üçgen ΑΒΓ,
ve verilen düzkenar açı Δ olsun.

It is necessary then
to the triangle ΑΒΓ equal
a parallelogram to construct
in the rectilineal angle Δ.

δεῖ δὴ
τῷ ΑΒΓ τριγώνῳ ἴσον
παραλληλόγραμμον συστήσασθαι
ἐν τῇ Δ γωνίᾳ εὐθυγράμμῳ.

Şimdi gerklidir
ΑΒΓ üçgenine eşit
bir paralelkenarın
Δ düzkenar açısına inşa edilmesi.

Suppose ΒΓ has been cut in two at Ε,

Τετμήσθω ἡ ΒΓ δίχα κατὰ τὸ Ε,

Varsayılsın ΒΓ kenarının Ε nok-

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and there has been joined AE,
and there has been constructed
on the straight ΕΓ,
and at the point E on it,
to angle Δ equal,
ΓΕΖ,
also, through A, parallel to ΕΓ,
suppose AH has been drawn,
and through Γ, parallel to EZ,
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 AE doğrusunun birleştirildiği,
ve inşa edildiği
ΕΓ doğrusunda,
ve üzerindekiE noktasında,
Δ açısına eşit,
ΓΕΖ açısının,
ayrıca, A noktasından, ΕΓ doğrusuna paralel,
ΑΗ doğrusunun çizilmiş olduğu varsayılsın,
ve Γ noktasından, EZ doğrusuna paralel,
ΓΗ doğrusunun çizilmiş olduğu varsayılsın;
dolayısıyla ΖΕΓΗ bir paralelkenardır.

And since equal is BE to ΕΓ,
equal is also
triangle ABE to triangle ΑΕΓ;
for they are on equal bases,
BE 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.

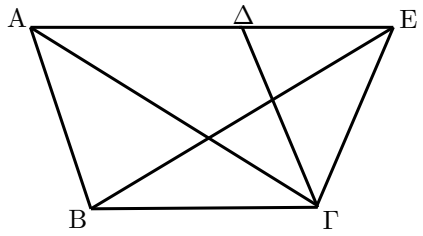
καὶ ἐπεὶ ἴση ἐστὶν ἡ ΒΕ τῇ ΕΓ,
ἴσον ἐστὶ καὶ
τὸ ΑΒΕ τρίγωνον τῷ ΑΕΓ τριγώνῳ·
ἐπί τε γὰρ ἴσων βάσεών εἰσι
τῶν ΒΕ, ΕΓ
καὶ ἐν ταῖς αὐταῖς παραλλήλοις
ταῖς ΒΓ, ΑΗ·
διπλάσιον ἄρα ἐστὶ
τὸ ΑΒΓ τρίγωνον τοῦ ΑΕΓ τριγώνου.
ἔστι δὲ καὶ
τὸ ΖΕΓΗ παραλληλόγραμμον
διπλάσιον τοῦ ΑΕΓ τριγώνου·
βάσιν τε γὰρ αὐτῷ τὴν αὐτὴν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



3·43

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.

DRAFT

are equal to one another.

ἴσα ἀλλήλοις ἐστίν.

Verilmiş olsun
bir ΑΒΓΔ paralelkenarı,
ve onun ΑΓ köşegeni,
ve ΑΓ etrafında
paralelkenarlar,
ΕΘ ve ΖΗ,
ve bunların tümleyenleri,
ΒΚ ile ΚΔ.

Let there be
a parallelogram ΑΒΓΔ,
and its diameter, ΑΓ,
and about ΑΓ
let be parallelograms,
ΕΘ and ΖΗ,[1]
and the so-called[2] complements,
ΒΚ and ΚΔ.

Ἔστω
παραλληλόγραμμον τὸ ΑΒΓΔ,
διάμετρος δὲ αὐτοῦ ἡ ΑΓ,
περὶ δὲ τὴν ΑΓ
παραλληλόγραμμα μὲν ἔστω
τὰ ΕΘ, ΖΗ,
τὰ δὲ λεγόμενα παραπληρώματα
τὰ ΒΚ, ΚΔ·

İddia ediyorum
eşittir ΒΚ tümleyeni
ΚΔ tümleyenine.

I say that
equal is the complement ΒΚ
to the complement ΚΔ.

λέγω, ὅτι
ἴσον ἐστὶ τὸ ΒΚ παραπλήρωμα
τῷ ΚΔ παραπληρώματι.

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

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

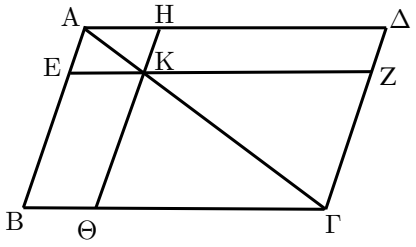
Ἐπεὶ γὰρ παραλληλόγραμμόν ἐστι
τὸ ΑΒΓΔ,
διάμετρος δὲ αὐτοῦ ἡ ΑΓ,
ἴσον ἐστὶ
τὸ ΑΒΓ τρίγωνον τῷ ΑΓΔ τριγώνῳ.
πάλιν, ἐπεὶ παραλληλόγραμμόν ἐστι
τὸ ΕΘ,
διάμετρος δὲ αὐτοῦ ἐστιν ἡ ΑΚ,
ἴσον ἐστὶ
τὸ ΑΕΚ τρίγωνον τῷ ΑΘΚ τριγώνῳ.
διὰ τὰ αὐτὰ δὴ καὶ
τὸ ΚΖΓ τρίγωνον τῷ ΚΗΓ ἐστιν ἴσον.
ἐπεὶ οὖν τὸ μὲν ΑΕΚ τρίγωνον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

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

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

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

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



3·44

[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.

DRAFT

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

Let be
the given straight AB,
and the given triangle, Γ,
and the given rectilineal angle, Δ.

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.

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.

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.

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.

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;

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

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

δεῖ δὴ
παρὰ τὴν δοθεῖσαν εὐθεῖαν τὴν AB
τῷ δοθέντι τριγώνῳ τῷ Γ ἴσον
παραλληλόγραμμον παραβαλεῖν
ἐν ἴσῃ τῇ Δ γωνίᾳ.

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.

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.

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.

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·

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

Verilen doğru AB,
ve verilen üçgen Γ,
ve verlen düzkenar açı Δ olsun.

Şimdi gereklidir
verilen AB doğrusu boyunca
Γ üçgenine eşit
bir paralelkenarı
Δ açısında yerleştirmek.

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.

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.

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.

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

DRAFT

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.

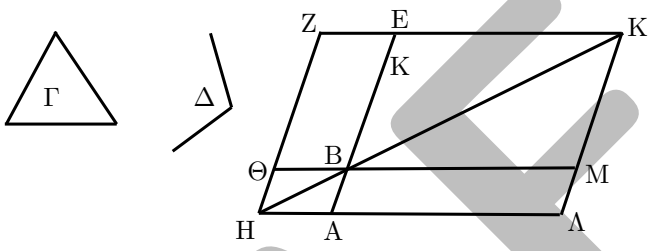
Therefore, along the given STRAIGHT,
AB,
equal to the given triangle, Γ,
a parallelogram has been applied,
ΛB,
in the angle ABM,
which is equal to Δ;
—just what it was necessary to do.

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.

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.

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.

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.



3·45

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

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

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

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

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

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

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

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

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

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·

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

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

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

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

Ve Ε açısı
ΘΚΖ ve ΗΘΜ açılarının her birine
eşit olduğundan,
ΘΚΖ da ΗΘΜ açısına
eşittir.
Eklenmiş olsun ΚΘΗ ortak olarak;

DRAFT

therefore ZKΘ and KΘH
to KΘH and HΘM
are equal.
But ZKΘ and KΘH
are equal to two RIGHTS;
therefore also KΘH and HΘM
are equal to two RIGHTS.
Then to some STRAIGHT, HΘ,
and at the same point, Θ,
two STRAIGHTS, KΘ and ΘM,
not lying in the same parts,
the adjacent angles
make equal to two RIGHTS.
In a STRAIGHT then are KΘ and ΘM;
and since on the parallels KM and ZH
fell the STRAIGHT ΘH,
the alternate angles MΘH and ΘHZ
are equal to one another.
Let ΘHΛ be added in common;
therefore MΘH and ΘHΛ
to ΘHZ and ΘHΛ
are equal.
But MΘH and ΘHΛ
are equal to two RIGHTS;
therefore also ΘHZ and ΘHΛ
are equal to two RIGHTS;
therefore on a STRAIGHT are ZH and HΛ.
And since ZK to ΘH
is equal and parallel,
but also ΘH to MΛ,
therefore also KZ to MΛ
is equal and parallel;
and join them
KM and ZΛ, which are STRAIGHTS;
therefore also KM and ZΛ
are equal and parallel;
a parallelogram therefore is KZΛM.
And since equal is
triangle ABΔ
to the parallelogram ZΘ,
and ΔBΓ to HM,
therefore, as a whole,
the rectilineal ABΓΔ
to parallelogram KZΛM as a whole
is equal.

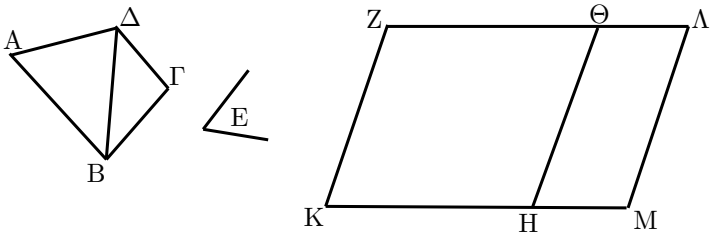
Therefore, to the given rectilineal [figure], ABΓΔ, equal,
a parallelogram has been constructed, KZΛM,
in the angle ZKM,
which is equal to the given E;
—just what it was necessary to do.

αἱ ἄρα ὑπὸ ZKΘ, KΘH
ταῖς ὑπὸ KΘH, HΘM
ἴσαι εἰσίν.
ἀλλ᾽ αἱ ὑπὸ ZKΘ, KΘH
δυσὶν ὀρθαῖς ἴσαι εἰσίν·
καὶ αἱ ὑπὸ KΘH, HΘM ἄρα
δύο ὀρθαῖς ἴσαι εἰσίν.
πρὸς δή τινι εὐθείᾳ τῇ HΘ
καὶ τῷ πρὸς αὐτῇ σημείῳ τῷ Θ
δύο εὐθεῖαι αἱ KΘ, ΘM
μὴ ἐπὶ τὰ αὐτὰ μέρη κείμεναι
τὰς ἐφεξῆς γωνίας
δύο ὀρθαῖς ἴσας ποιοῦσιν·
ἐπ᾽ εὐθείας ἄρα ἐστὶν ἡ KΘ τῇ ΘM·
καὶ ἐπεὶ εἰς παραλλήλους τὰς KM, ZH
εὐθεῖα ἐνέπεσεν ἡ ΘH,
αἱ ἐναλλὰξ γωνίαι αἱ ὑπὸ MΘH, ΘHZ
ἴσαι
ἀλλήλαις εἰσίν.
κοινὴ προσκείσθω ἡ ὑπὸ ΘHΛ·
αἱ ἄρα ὑπὸ MΘH, ΘHΛ ταῖς ὑπὸ ΘHZ, ΘHΛ
ἴσαι εἰσιν.
αλλ᾽ αἱ ὑπὸ MΘH, ΘHΛ
δύο ὀρθαῖς ἴσαι εἰσίν·
καὶ αἱ ὑπὸ ΘHZ, ΘHΛ ἄρα
δύο ὀρθαῖς ἴσαι εἰσίν·
ἐπ᾽ εὐθείας ἄρα ἐστὶν ἡ ZH τῇ HΛ.
καὶ ἐπεὶ ἡ ZK τῇ ΘH
ἴση τε καὶ παράλληλός ἐστιν,
ἀλλὰ καὶ ἡ ΘH τῇ MΛ,
καὶ ἡ KZ ἄρα τῇ MΛ
ἴση τε καὶ παράλληλός ἐστιν·
καὶ ἐπιζευγνύουσιν αὐτὰς εὐθεῖαι αἱ KM, ZΛ·
καὶ αἱ KM, ZΛ ἄρα
ἴσαι τε καὶ παράλληλοί εἰσιν·
παραλληλόγραμμον ἄρα ἐστὶ τὸ KZΛM.
καὶ ἐπεὶ ἴσον ἐστὶ
τὸ μὲν ABΔ τρίγωνον τῷ ZΘ παραλληλογράμμῳ,
τὸ δὲ ΔBΓ τῷ HM,
ὅλον ἄρα τὸ ABΓΔ εὐθύγραμμον
ὅλῳ τῷ KZΛM παραλληλογράμμῳ
ἐστὶν ἴσον.

Τῷ ἄρα δοθέντι εὐθυγράμμῳ τῷ ABΓΔ ἴσον
παραλληλόγραμμον συνέσταται
τὸ KZΛM
ἐν γωνίᾳ τῇ ὑπὸ ZKM,
ἥ ἐστιν ἴση τῇ δοθείσῃ τῇ E·
ὅπερ ἔδει ποιῆσαι.

dolayısıyla ZKΘ ve KΘH,
KΘH ve HΘM açılarına
eşittirler.
Fakat ZKΘ ve KΘH
eşittirler iki dik açıya;
dolayısıyla KΘH ve HΘM açılarıda
eşittirler iki dik açıya.
Şimdi bir HΘ doğrusuna,
ve aynı Θ noktasında,
iki KΘ ve ΘM doğruları,
aynı tarafta kalmayan,
komşu açıları
iki dik açıya eşit yapar.
O zaman bir doğrudadır KΘ ve ΘM;
ve KM ve ZH paralelleri üzerine
düştüğünden ΘH doğrusu,
ters MΘH ve ΘHZ açıları
eşittir birbirine.
eklenmiş olsun ΘHΛ ortak olarak;
dolayısıyla MΘH ve ΘHΛ,
ΘHZ ve ΘHΛ açılarına
eşittirler.
Fakat MΘH ve ΘHΛ
eşittirler iki dik açıya;
dolayısıyla ΘHZ ve ΘHΛ da
eşittirler iki dik açıya;
dolaysısyla bir doğru üzerindedir ZH ve HΛ.
Ve olduğundan ZK, ΘH doğrusuna
eşit ve paralel,
ve de ΘH, MΛ doğrusuna,
dolayısıyla KZ da MΛ doğrusuna
eşit ve paraleldir;
ve birleştirir onları KM ile ZΛ, ki bunlarda doğrulardır;
dolayısıyla KM ve ZΛ da
eşit ve paraleldirler;
dolayısıyla KZΛM bir paralelkenardır.
Ve eşit olduğundan
ABΔ üçgeni
ZΘ paralelkenarına,
ve ΔBΓ, HM paralelkenarına,
dolayısısyla, bir bütün olarak,
ABΓΔ düzkenarı
bir bütün olarak KZΛM paralelkenarına
eşittir.

Dolayısıyla, verilen düzkenar ABΓΔ figürüne eşit,
bir KZΛM paralelkenarı inşa edilmiş oldu,
ZKM açısında,
eşit olan verilmiş E açısına;
— yapılması gereken tam buydu.



DRAFT

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 AB·	Verilmiş olsun AB doğrusu.
It is required then on the STRAIGHT AB to set up a square.	δεῖ δὴ ἀπὸ τῆς AB 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, AΓ, and suppose there has been laid down, equal to AB, AΔ; and through the point Δ, parallel to AB, suppose there has been drawn ΔE; and through the point B, parallel to AΔ, suppose there has been drawn BE.	Ἤχθω τῇ AB εὐθείᾳ ἀπὸ τοῦ πρὸς αὐτῇ σημείου τοῦ A πρὸς ὀρθὰς ἡ AΓ, καὶ κείσθω τῇ AB ἴση ἡ AΔ· καὶ διὰ μὲν τοῦ Δ σημείου τῇ AB παράλληλος ἤχθω ἡ ΔE, διὰ δὲ τοῦ B σημείου τῇ AΔ παράλληλος ἤχθω ἡ BE.	Çizilmiş olsun AB doğrusunda, onun A noktasında, dik açıda, AΓ, ve yerleştirilmiş olsun, AB doğrusuna eşit, AΔ; ve Δ noktasından, AB doğrusuna paralel, çizilmiş olsun ΔE; ve B noktasından, AΔ doğrusuna paralel, BE çizilmiş olsun.
A parallelogram therefore is AΔEB; equal therefore is AB to ΔE, and AΔ to BE. But AB to AΔ is equal. Therefore the four BA, AΔ, ΔE, and EB are equal to one another; equilateral therefore is the parallelogram AΔEB.	παραλληλόγραμμον ἄρα ἐστὶ τὸ AΔEB· ἴση ἄρα ἐστὶν ἡ μὲν AB τῇ ΔE, ἡ δὲ AΔ τῇ BE. ἀλλὰ ἡ AB τῇ AΔ ἐστιν ἴση· αἱ τέσσαρες ἄρα αἱ BA, AΔ, ΔE, EB ἴσαι ἀλλήλαις εἰσίν· ἰσόπλευρον ἄρα ἐστὶ τὸ AΔEB παραλληλόγραμμον.	Bir paralelkenardır dolayısıyla AΔEB; eşittir dolayısıyla AB, ΔE doğrusuna, ve AΔ, BE doğrusuna. Ama AB, AΔ doğrusuna eşittir. Dolaysısıyla şu dördü BA, AΔ, ΔE ve EB birbirlerine eşittirler; eşkenardır dolayısıyla AΔEB 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 ΔE fell the STRAIGHT AΔ, therefore the angles BAΔ and AΔE are equal to two RIGHTS. And BAΔ is right; right therefore is AΔE. And of parallelogram areas the opposite sides and angles are equal to one another. Right therefore is either of the opposite angles ABE and BEΔ; right-angled therefore is AΔEB. And it was shown also equilateral.	ἐπεὶ γὰρ εἰς παραλλήλους τὰς AB, ΔE εὐθεῖα ἐνέπεσεν ἡ AΔ, αἱ ἄρα ὑπὸ BAΔ, AΔE γωνίαι δύο ὀρθαῖς ἴσαι εἰσίν. ὀρθὴ δὲ ἡ ὑπὸ BAΔ· ορθὴ ἄρα καὶ ἡ ὑπὸ AΔE. τῶν δὲ παραλληλογράμμων χωρίων αἱ ἀπεναντίον πλευραί τε καὶ γωνίαι ἴσαι ἀλλήλαις εἰσίν· ὀρθὴ ἄρα καὶ ἑκατέρα τῶν ἀπεναντίον τῶν ὑπὸ ABE, BEΔ γωνιῶν· ὀρθογώνιον ἄρα ἐστὶ τὸ AΔEB. ἐδείχθη δὲ καὶ ἰσόπλευρον.	Çünkü, AB ve ΔE paralellerinin üzer- ine düştüğünden AΔ doğrusu, eşittir dolaysıyla BAΔ ve AΔE iki dik açıya. Ve BAΔ diktir; diktir dolayısıyla AΔE. Ve paralelkenar alanların karşıt kenar ve açıları eşittir birbirlerine. Diktir dolayısıyla her bir karşıt açı ABE ve BEΔ; dik açılıdır dolayısıyla AΔEB. 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 AB εὐθείας ἀναγεγραμμένον· ὅπερ ἔδει ποιῆσαι.	Bir karedir dolayısıyla o; ve o AB doğrusu üzerine kurulmuştur; — yapılması gereken tam buydu.

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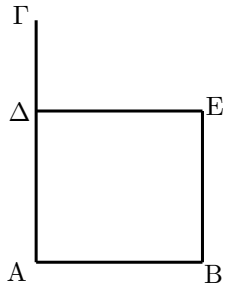


3·47

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

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

DRAFT

ΔB to BΓ,
and ZB to BA,
the two ΔB and BA
to the two ZB and BΓ[2]
are equal,
either to either;
and angle ΔBA
to angle ZBΓ
is equal;
therefore the base AΛ
to the base ZΓ
[is] equal,
and the triangle ABΛ
to the triangle ZBΓ
is equal;
and of the triangle ABΔ
the parallelogram BΛ is double;
for they have the same base, BΛ,
and are in the same parallels,
BΔ and AΛ;
and of the triangle ZBΓ
the square HB is double;
for again they have the same base,
ZB,
and are in the same parallels,
ZB and HΓ.
[And of equals,
the doubles are equal to one another.]
Equal therefore is
also the parallelogram BΛ
to the square HB.
Similarly then,
there being joined AE and BK,
it will be shown that
also the parallelogram ΓΛ
[is] equal to the square ΘΓ.
Therefore the square ΔBEΓ as a whole
to the two squares HB and ΘΓ
is equal.
Also is
the square BΔEΓ set up on BΓ,
and HB and ΘΓ on BA and AΓ.
Therefore the square on the side BΓ
is equal
to the squares on the sides BA and AΓ.

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 ZB τῇ BA,
δύο δὴ αἱ ΔB, BA
δύο ταῖς ZB, BΓ
ἴσαι εἰσὶν
ἑκατέρα ἑκατέρᾳ·
καὶ γωνία ἡ ὑπὸ ΔBA
γωνίᾳ τῇ ὑπὸ ZBΓ
ἴση·
βάσις ἄρα ἡ AΔ
βάσει τῇ ZΓ
[ἐστιν] ἴση,
καὶ τὸ ABΔ τρίγωνον
τῷ ZBΓ τριγώνῳ
ἐστὶν ἴσον·
καί [ἐστι] τοῦ μὲν ABΔ τριγώνου
διπλάσιον τὸ BΛ παραλληλόγραμμον·
βάσιν τε γὰρ τὴν αὐτὴν ἔχουσι τὴν BΔ
καὶ ἐν ταῖς αὐταῖς εἰσι παραλλήλοις
ταῖς BΔ, AΛ·
τοῦ δὲ ZBΓ τριγώνου
διπλάσιον τὸ HB τετράγωνον·
βάσιν τε γὰρ πάλιν τὴν αὐτὴν ἔχουσι
τὴν ZB
καὶ ἐν ταῖς αὐταῖς εἰσι παραλλήλοις
ταῖς ZB, HΓ.
[τὰ δὲ τῶν ἴσων
διπλάσια ἴσα ἀλλήλοις ἐστίν·]
ἴσον ἄρα ἐστὶ
καὶ τὸ BΛ παραλληλόγραμμον
τῷ HB τετραγώνῳ.
ὁμοίως δὴ
ἐπιζευγνυμένων τῶν AE, BK
δειχθήσεται
καὶ τὸ ΓΛ παραλληλόγραμμον
ἴσον τῷ ΘΓ τετραγώνῳ·
ὅλον ἄρα τὸ BΔEΓ τετράγωνον
δυσὶ τοῖς HB, ΘΓ τετραγώνοις
ἴσον ἐστίν.
καί ἐστι
τὸ μὲν BΔEΓ τετράγωνον ἀπὸ τῆς BΓ ἀναγραφέν,
τὰ δὲ HB, ΘΓ ἀπὸ τῶν BA, AΓ.
τὸ ἄρα ἀπὸ τῆς BΓ πλευρᾶς τετράγωνον
ἴσον ἐστὶ
τοῖς ἀπὸ τῶν BA, AΓ πλευρῶν τετραγώνοις.

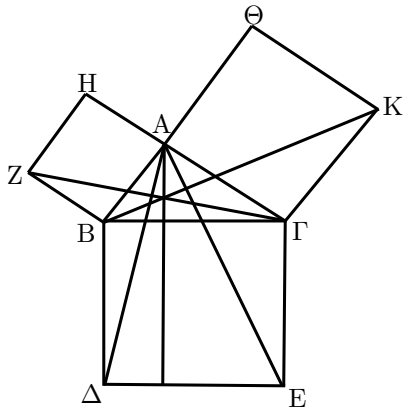
Ἐν ἄρα τοῖς ὀρθογωνίοις τριγώνοις
τὸ ἀπὸ τῆς τὴν ὀρθὴν γωνίαν ὑποτεινούσης πλευρᾶς τετράγωνον
ἴσον ἐστὶ
τοῖς ἀπὸ τῶν τὴν ὀρθὴν [γωνίαν] περιεχουσῶν πλευρῶν τετραγώνοις·
ὅπερ ἔδει δεῖξαι.

ve ZB, BA doğrusuna
ΔB ve BA ikilisi
ZB ve BΓ ikilisine[3]
eşittirler,
her biri birine;
ve ΔBA açısı
ZBΓ açısına
eşittir;
dolayısıyla AΛ tabanı
ZΓ tabanına
eşittir,
ve ABΛ üçgeni
ZBΓ üçgenine
eşittir;
ve ABΔ üçgeninin
BΛ paralelkenarı iki katıdır;
aynı BΛ tabanları olduğu,
ve aynı
BΔ ve AΛ parallerinde oldukları için;
ve ZBΓ üçgeninin
HB karesi iki katıdır;
yine aynı
ZB tabanları olduğu
ve aynı
ZB ve HΓ parallerinde oldukları için.
[Ve eşitlerin,
iki katları birbirlerine eşittirler.]
Eşittir dolaysıyla
BΛ paralelkenarı da
HB karesine.
Şimdi benzer şekilde,
birleştirildiğinde AE ve BK,
gösterilecek ki
ΓΛ paralelkenarı da
eşittir ΘΓ karesine.
Dolayısıyla ΔBEΓ bir bütün olarak
HB ve ΘΓ iki karesine
eşittir.
Ayrıca
BΔEΓ karesi BΓ üzerine kurulmuştur,
ve HB ve ΘΓ, BA ve AΓ üzerine.
Dolayısıyla BΓ kenarındaki kare
eşittir
BA ve AΓ 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?

DRAFT



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	

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

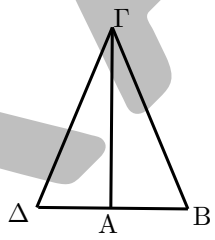
τὸ ἀπὸ τῆς ΒΓ·
ὑπόκειται γάρ·
τὸ ἄρα ἀπὸ τῆς ΔΓ τετράγωνον
ἴσον ἐστὶ
τῷ ἀπὸ τῆς ΒΓ τετραγώνῳ·
ὥστε καὶ πλευρὰ
ἡ ΔΓ τῇ ΒΓ
ἐστιν ἴση·
καὶ ἐπεὶ ἴση ἐστὶν ἡ ΔΑ τῇ ΑΒ,
κοινὴ δὲ ἡ ΑΓ,
δύο δὴ αἱ ΔΑ, ΑΓ
δύο ταῖς ΒΑ, ΑΓ
ἴσαι εἰσίν·
καὶ βάσις ἡ ΔΓ
βάσει τῇ ΒΓ
ἴση·
γωνία ἄρα ἡ ὑπὸ ΔΑΓ
γωνίᾳ τῇ ὑπὸ ΒΑΓ
[ἐστιν] ἴση.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

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

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

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

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



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Bibliography

[1] Euclid, *Euclidis Elementa*, Euclidis Opera Omnia, Teubner, 1883, Edited, and with Latin translation, by I. L. Heiberg.

[2] ———, *The thirteen books of Euclid's Elements translated from the text of Heiberg. Vol. I: Introduction and Books I, II. Vol. II: Books III–IX. Vol. III: Books X–XIII and Appendix*, Dover Publications Inc., New York, 1956, Translated with introduction and commentary by Thomas L. Heath, 2nd ed. MR 17,814b

[3] ———, *Euclid's Elements*, Green Lion Press, Santa Fe, NM, 2002, All thirteen books complete in one volume, the Thomas L. Heath translation, edited by Dana Densmore. MR MR1932864 (2003j:01044)

[4] H. W. Fowler, *A dictionary of modern English usage*, second ed., Oxford University Press, 1982, revised and edited by Ernest Gowers.

[5] ———, *A dictionary of modern English usage*, Wordsworth Editions, Ware, Hertfordshire, UK, 1994, reprint of the original 1926 edition.

[6] Homer C House and Susan Emolyn Harman, *Descriptive english grammar*, second ed., Prentice-Hall, Englewood Cliffs, N.J., USA, 1950, Revised by Susan Emolyn Harman. Twelfth printing, 1962.

[7] Rodney Huddleston and Geoffrey K. Pullum, *The Cambridge grammar of the English language*, Cambridge University Press, Cambridge, UK, 2002, reprinted 2003.

[8] Wilbur R. Knorr, *The wrong text of Euclid: on Heiberg's text and its alternatives*, Centaurus **38** (1996), no. 2-3, 208–276. MR 1384401 (97c:01007)

[9] ———, *On Heiberg's Euclid*, Sci. Context **14** (2001), no. 1-2, 133–143, Intercultural transmission of scientific knowledge in the middle ages: Graeco-Arabic-Latin (Berlin, 1996). MR 1892196 (2003b:01009)

[10] Henry George Liddell and Robert Scott, *A Greek-English lexicon*, Clarendon Press, Oxford, 1996, revised and augmented throughout by Sir Henry Stuart Jones, with the assistance of Roderick McKenzie and with the cooperation of many scholars. With a revised supplement.

[11] James Morwood and John Taylor (eds.), *The pocket Oxford classical Greek dictionary*, Oxford University Press, Oxford, 2002.

[12] Reviel Netz, *The shaping of deduction in Greek mathematics*, Ideas in Context, vol. 51, Cambridge University Press, Cambridge, 1999, A study in cognitive history. MR MR1683176 (2000f:01003)

[13] Allardyce Nicoll (ed.), *Chapman's Homer: The Iliad*, paperback ed., Princeton University Press, Princeton, New Jersey, 1998, With a new preface by Garry Wills. Original publication, 1956.

[14] Proclus, *A commentary on the first book of Euclid's* Elements, Princeton Paperbacks, Princeton University Press, Princeton, NJ, 1992, Translated from the Greek and with an introduction and notes by Glenn R. Morrow, Reprint of the 1970 edition, With a foreword by Ian Mueller. MR MR1200456 (93k:01008)

[15] Atilla Özkırımlı, *Türk dili, dil ve anlatım [the turkish language, language, and expression]*, İstanbul Bilgi Üniversitesi Yayınları, 2001, Yaşayan Türkçe Üzerine Bir Deneme [An Essay on Living Turkish].

[16] Herbert Weir Smyth, *Greek grammar*, Harvard University Press, Cambridge, Massachussets, 1980, Revised by Gordon M. Messing, 1956. Eleventh Printing. Original edition, 1920.

[17] Ivor Thomas (ed.), *Selections illustrating the history of Greek mathematics. Vol. II. From Aristarchus to Pappus*, Harvard University Press, Cambridge, Mass, 1951, With an English translation by the editor. MR 13,419b

[18] Henry David Thoreau, *Walden [1854] and other writings*, Bantam Books, New York, 1962, Edited and with an introduction by Joseph Wood Krutch.

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