

EEN CULTUURGESCHIEDENIS VAN DE GONIOMETRIE

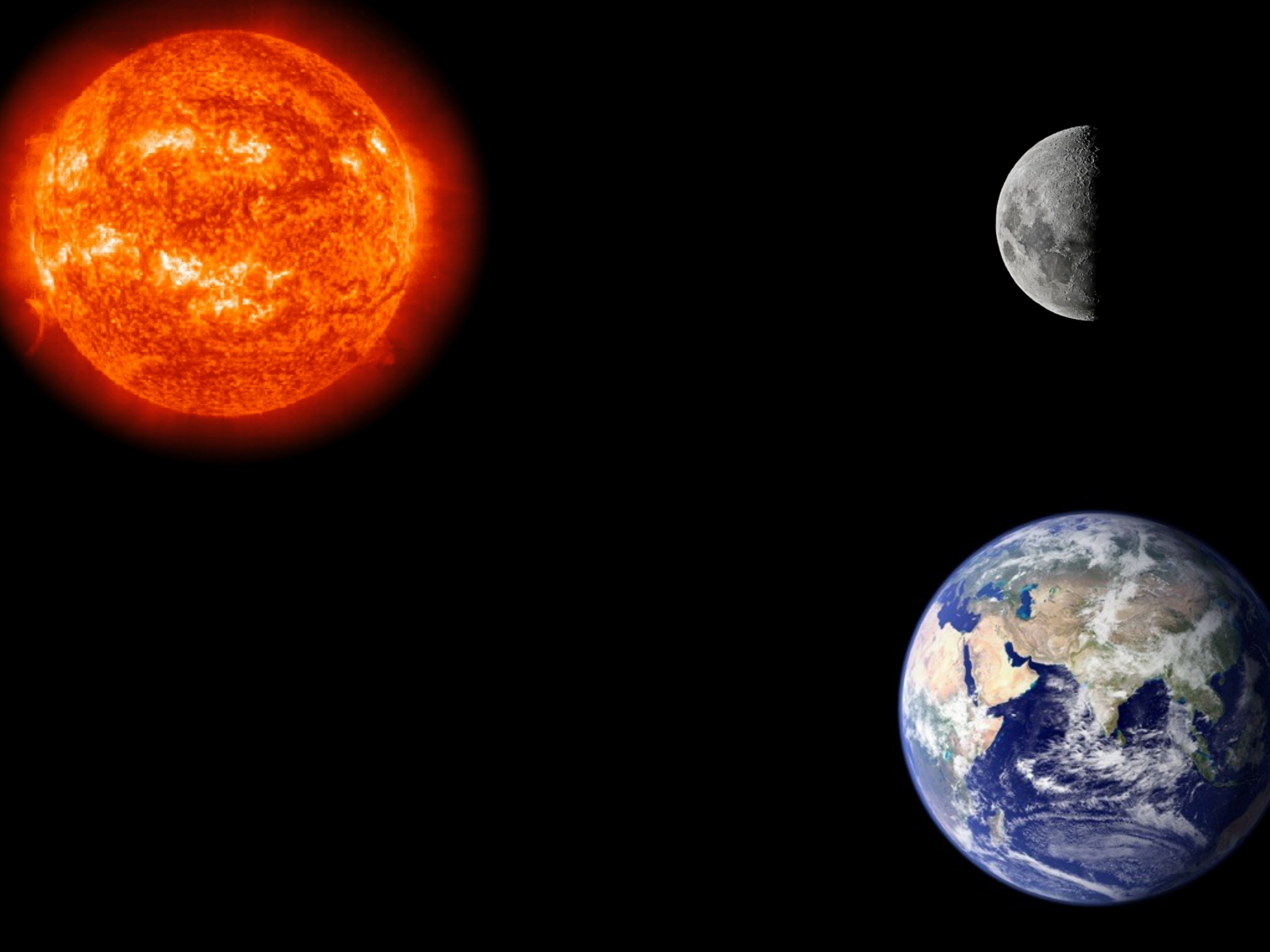
Viktor Blåsjö
Universiteit Utrecht

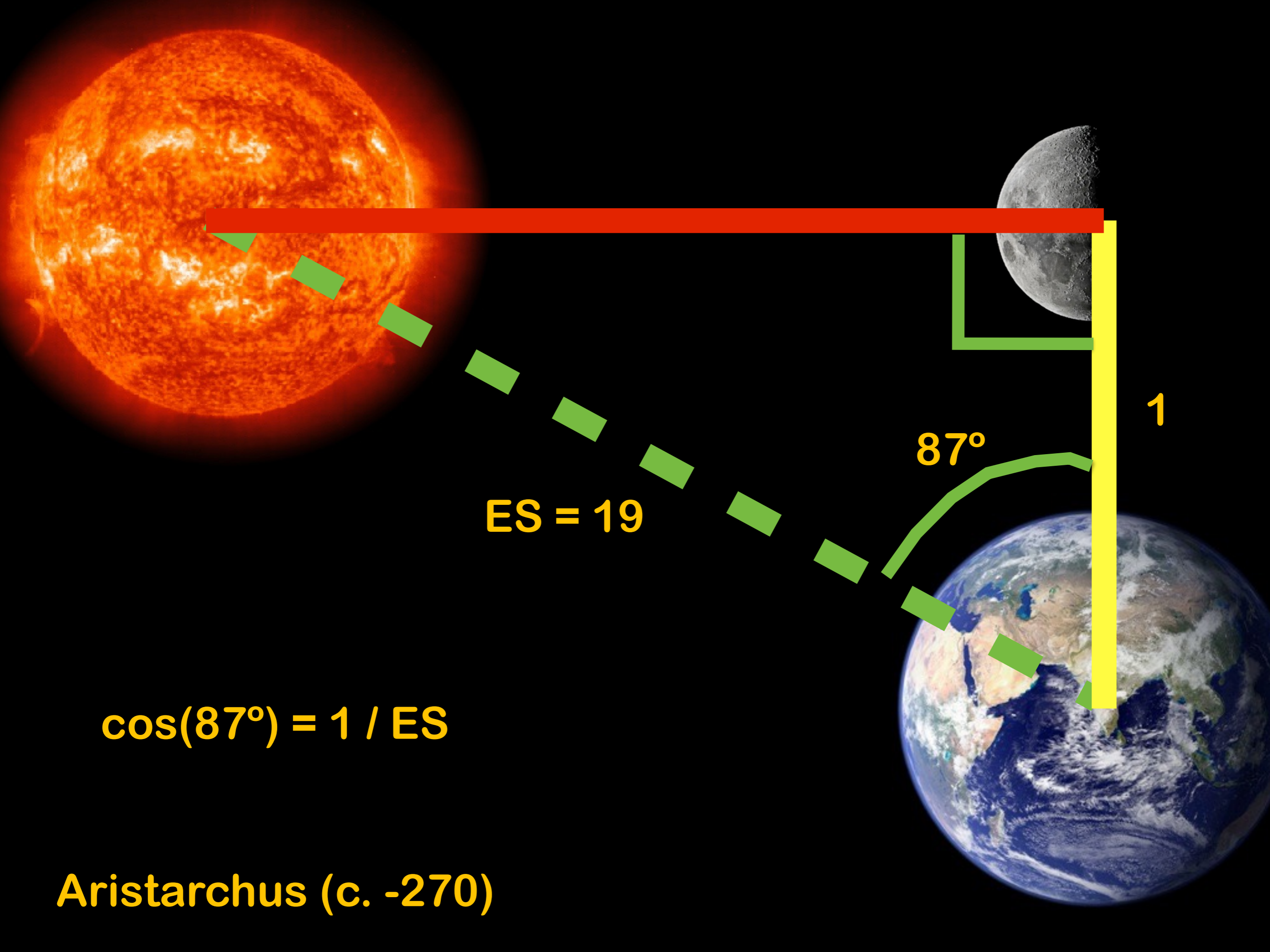


V.N.E.Blasjo@uu.nl



@viktorblasjo





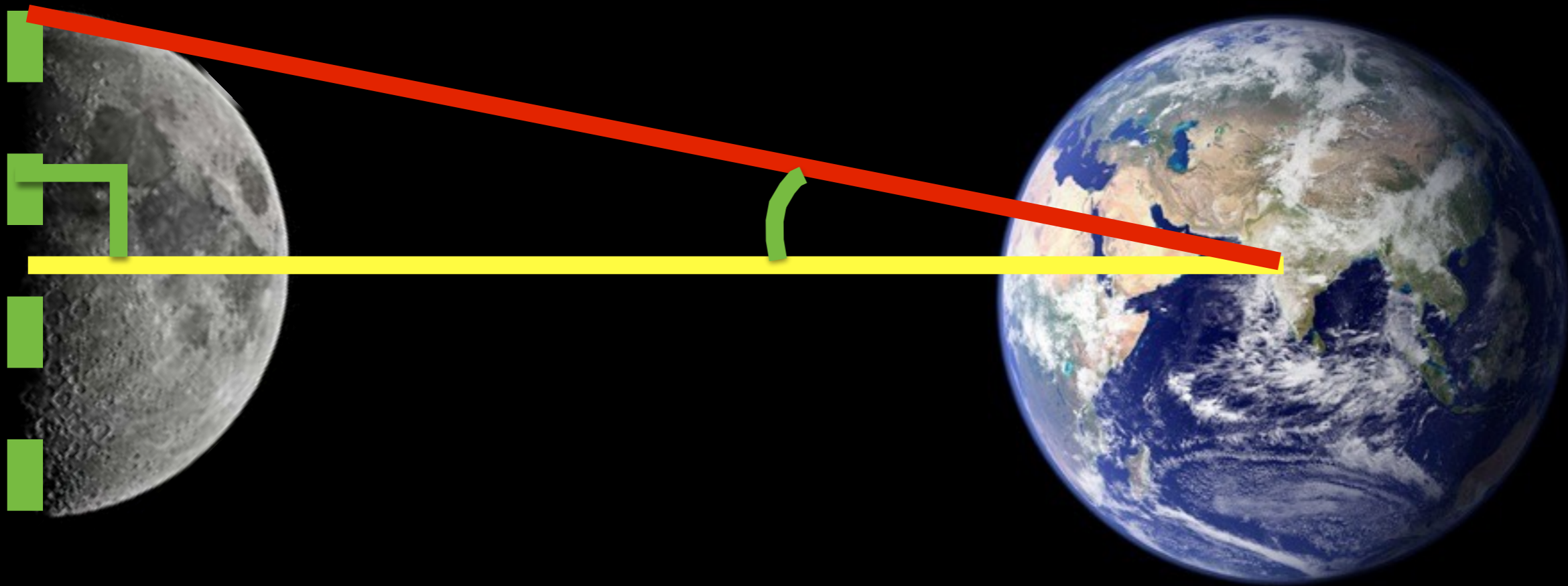
ES = 19

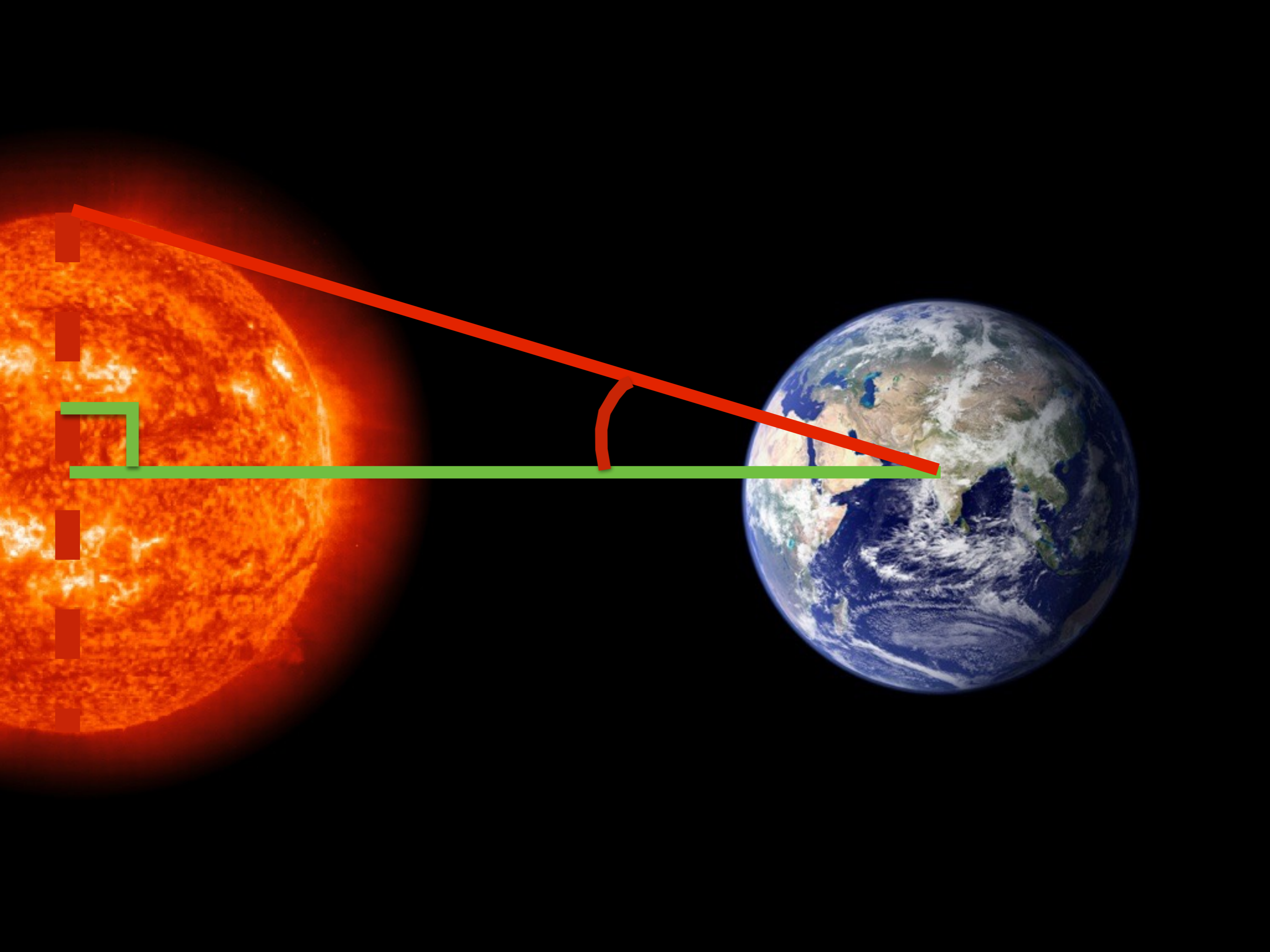
87°

1

$$\cos(87^\circ) = 1 / ES$$

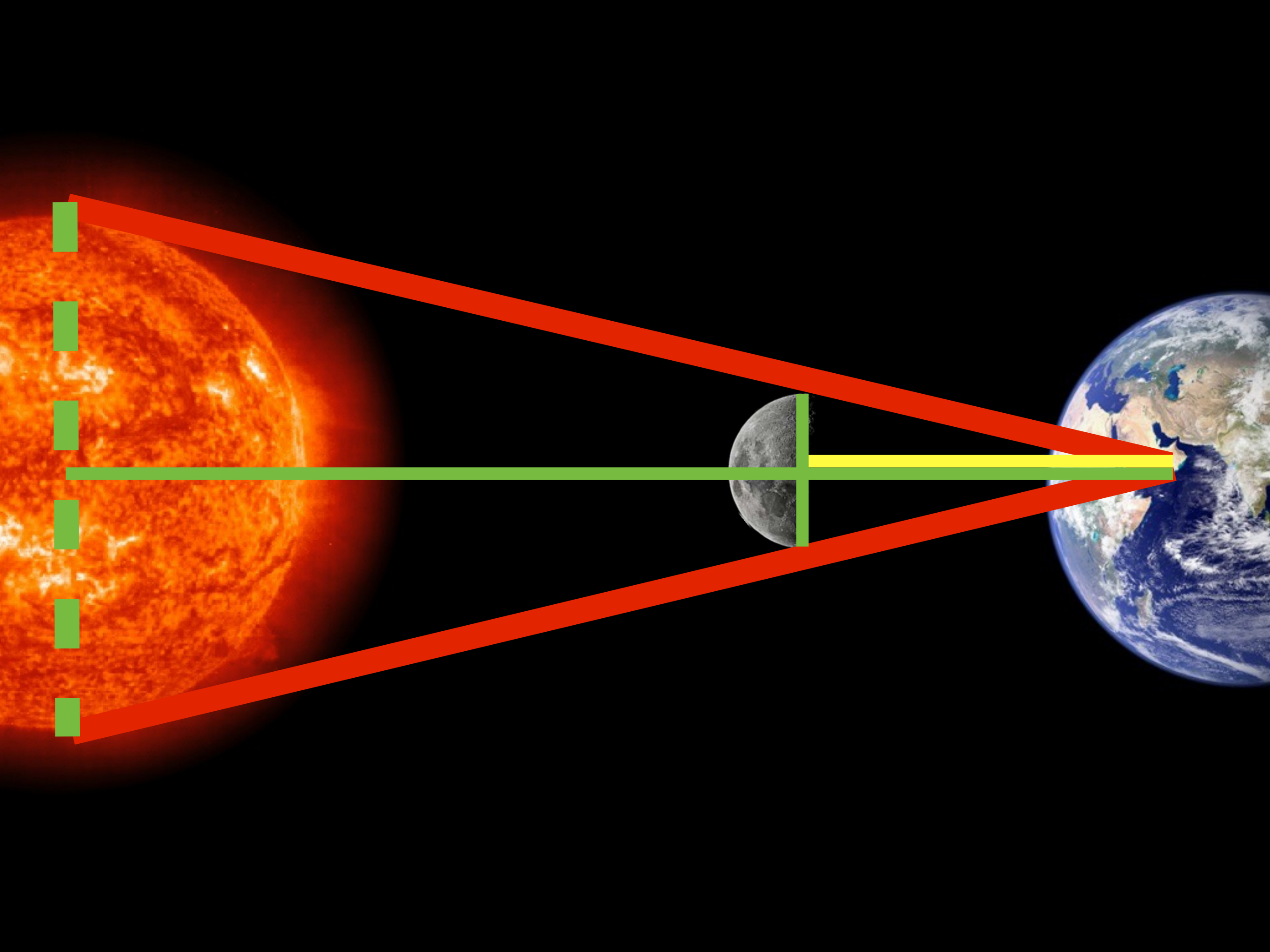
Aristarchus (c. -270)





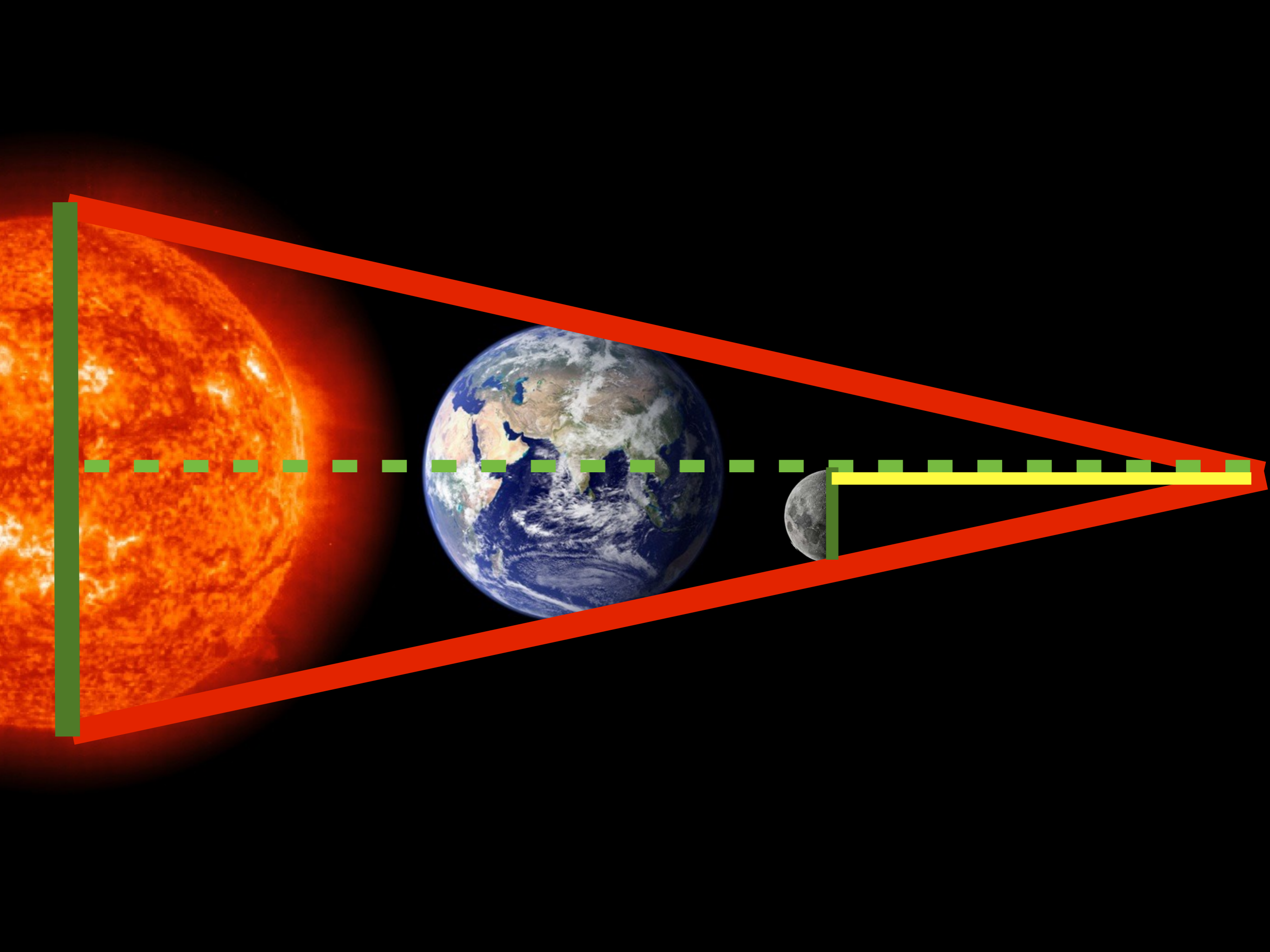


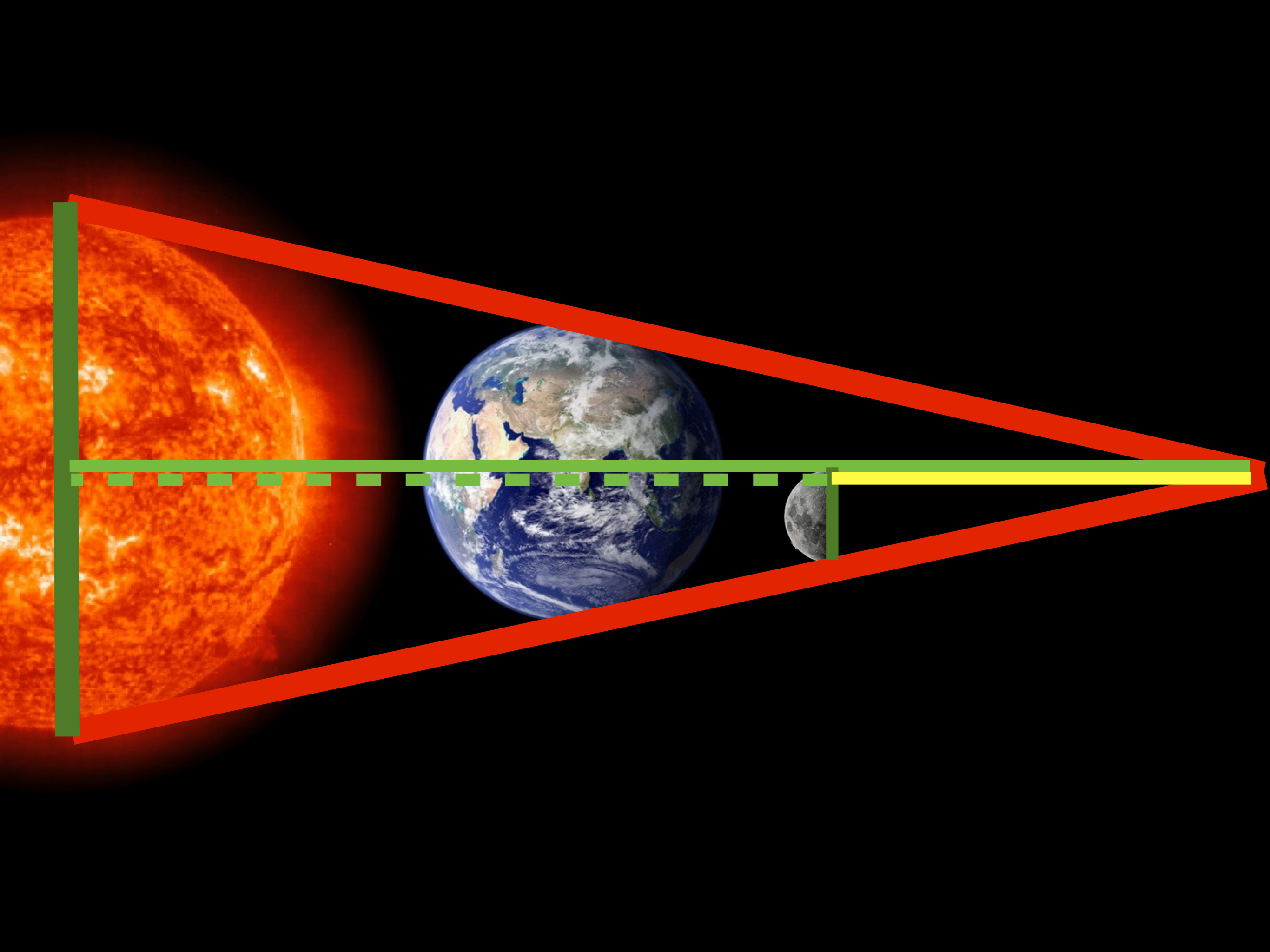
Solar eclipse: size of moon = size of sun

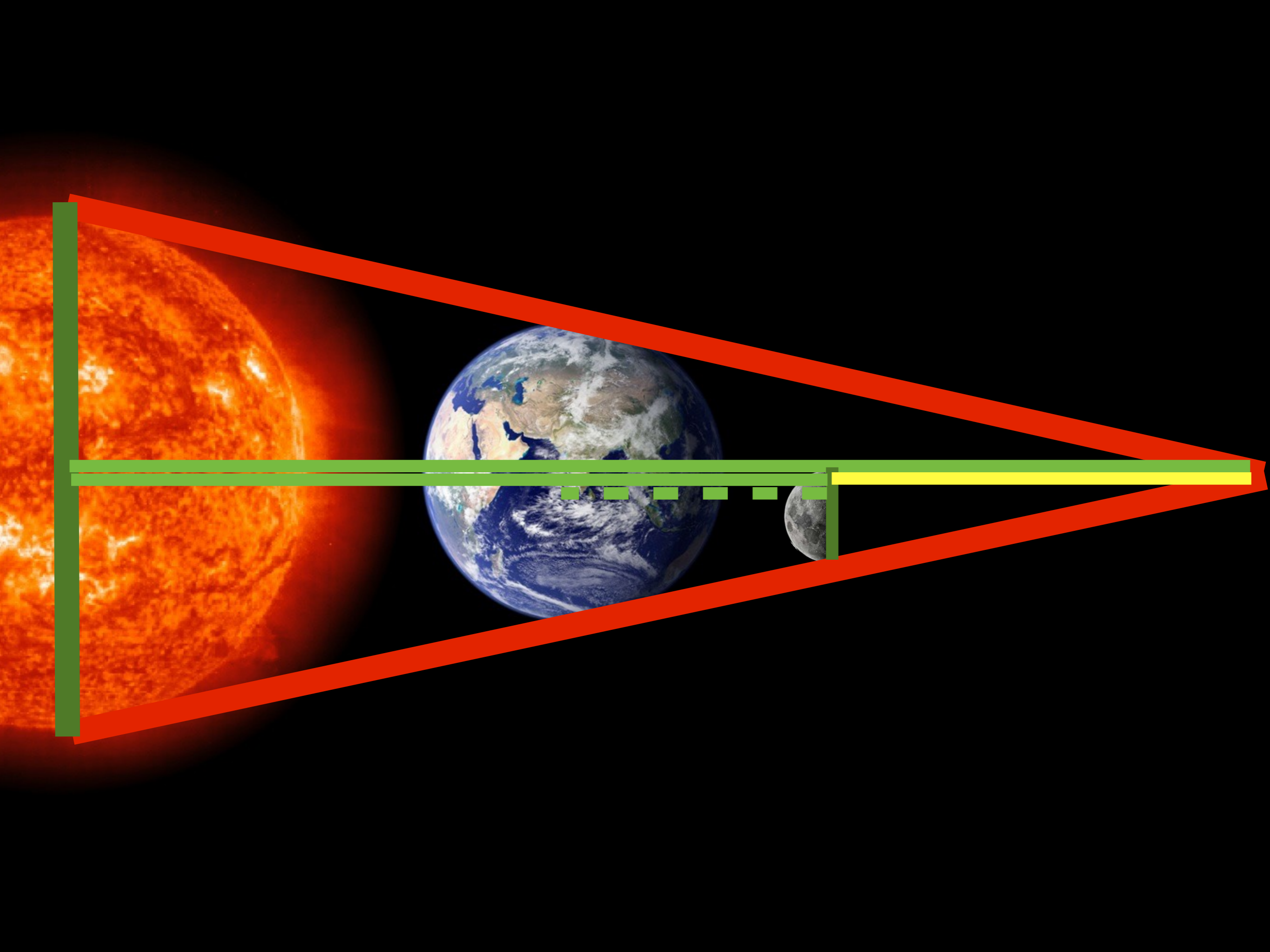


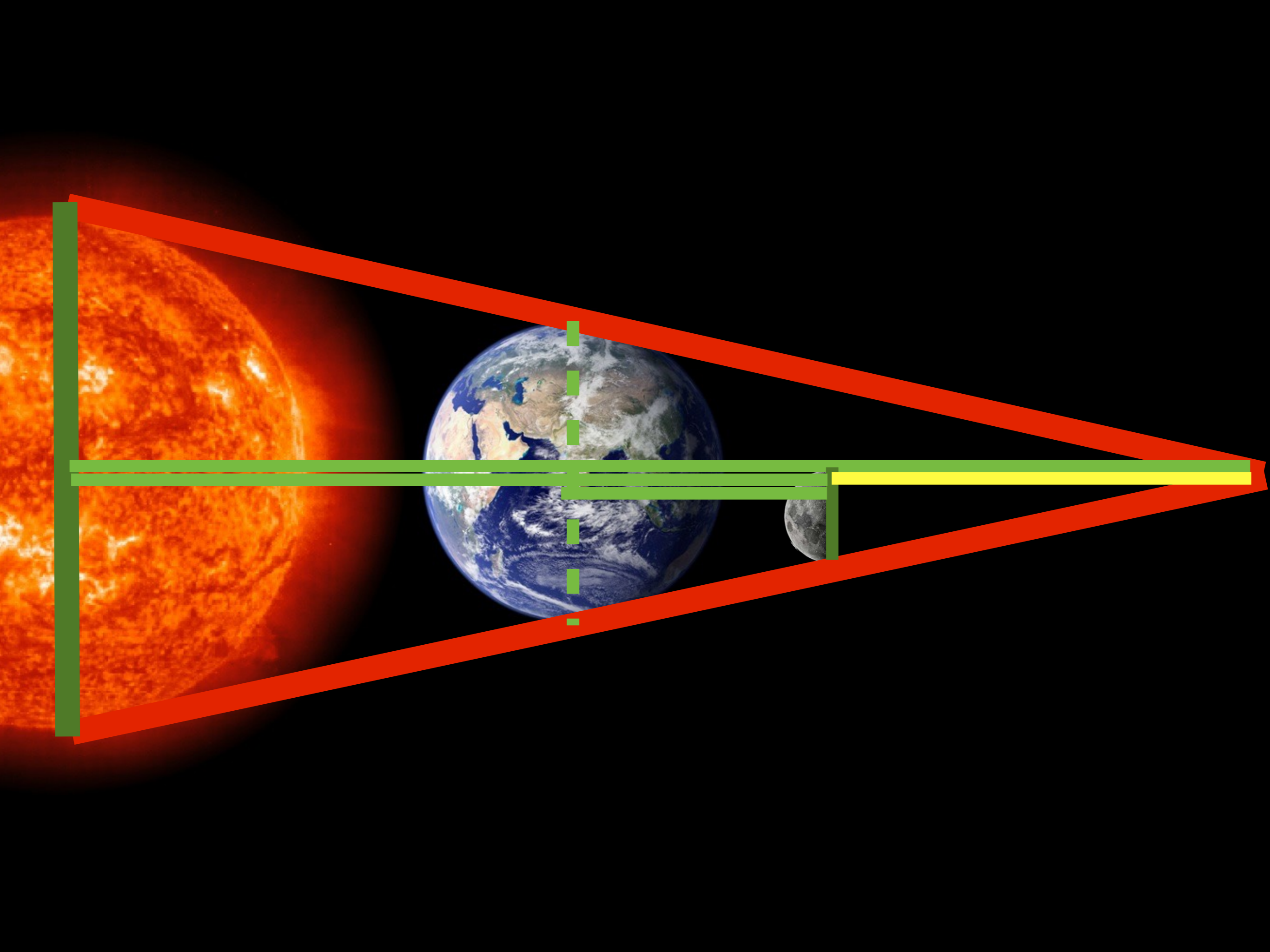


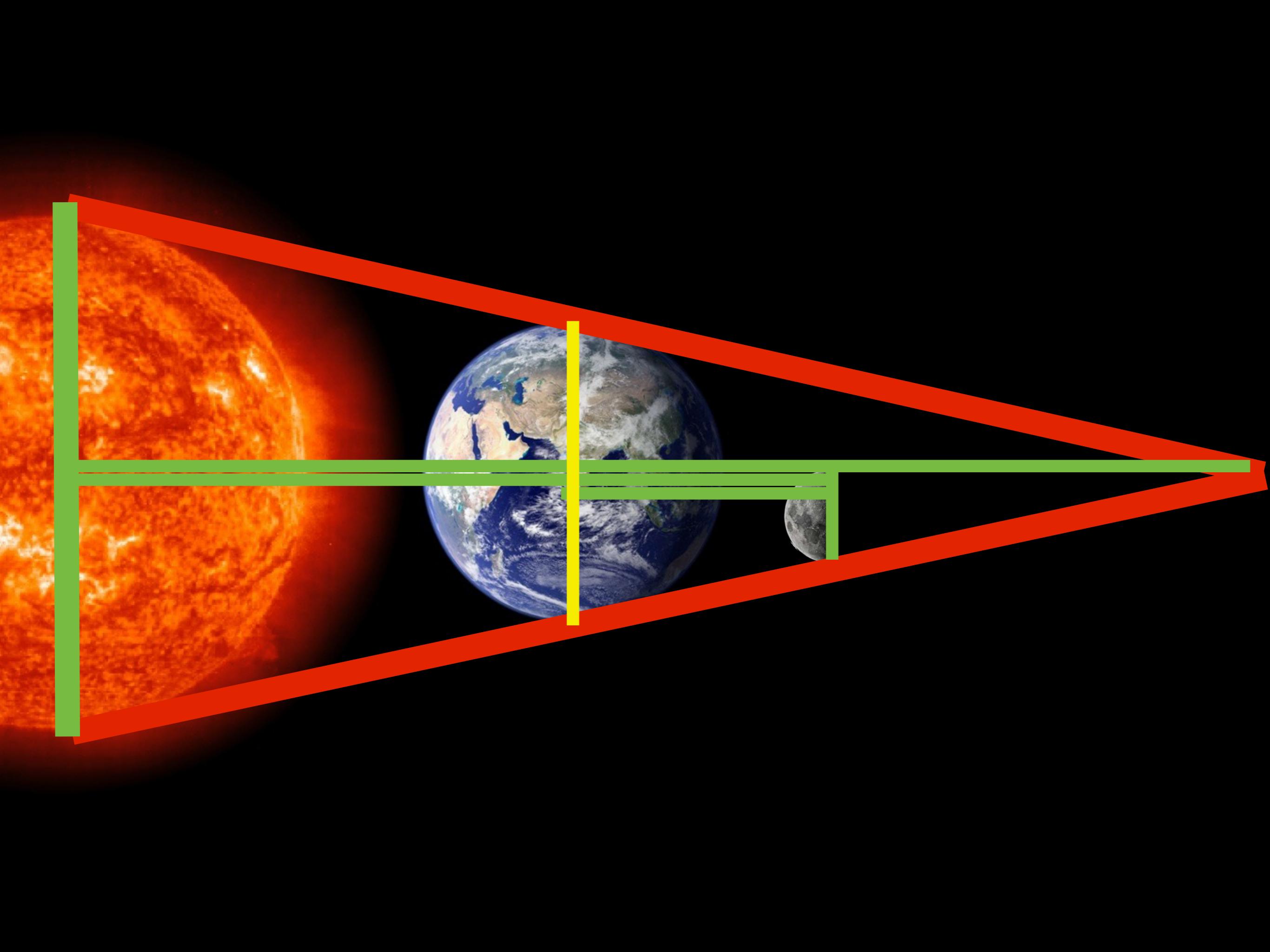
Lunar eclipse: size of earth = twice size of moon



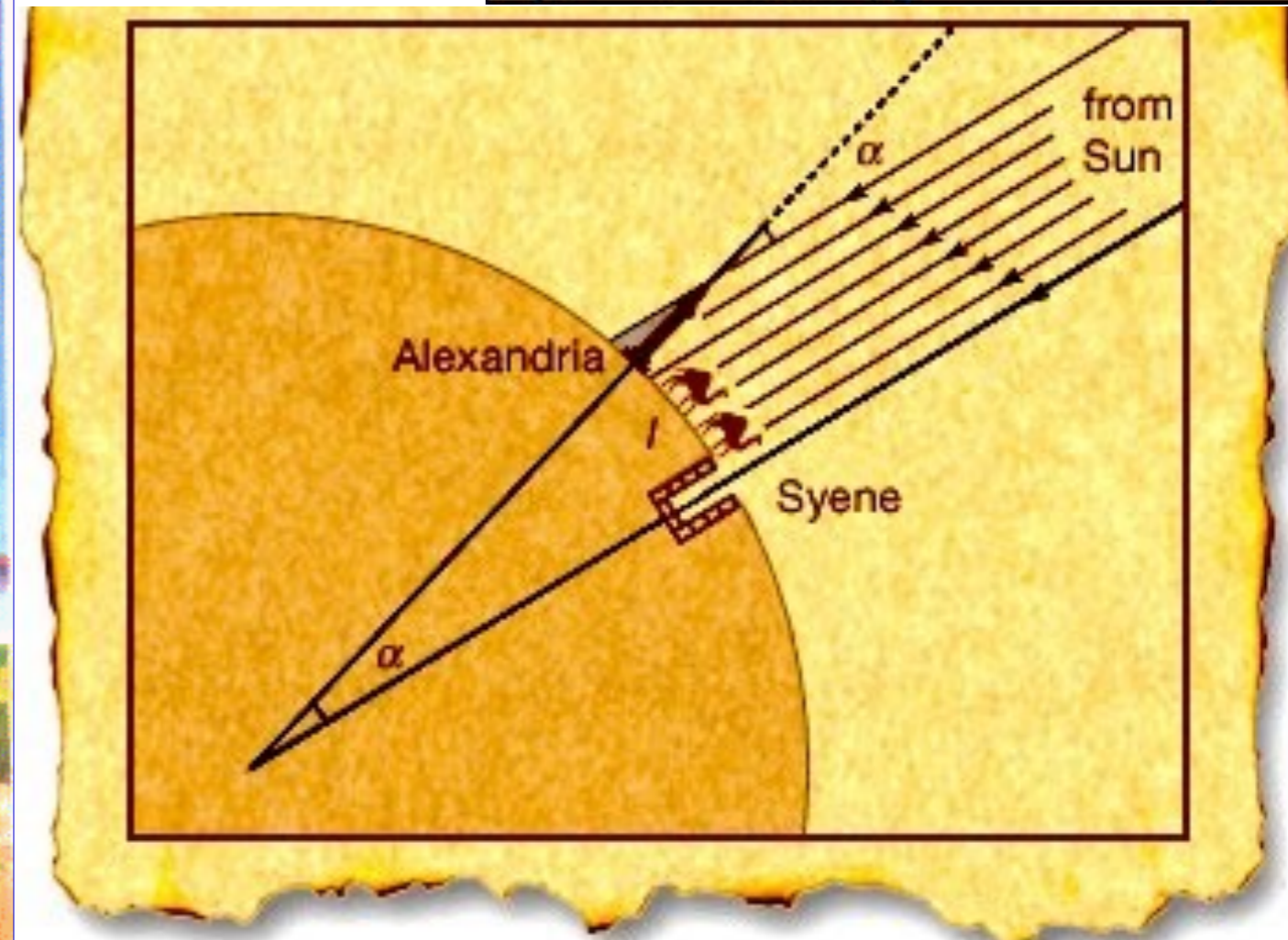
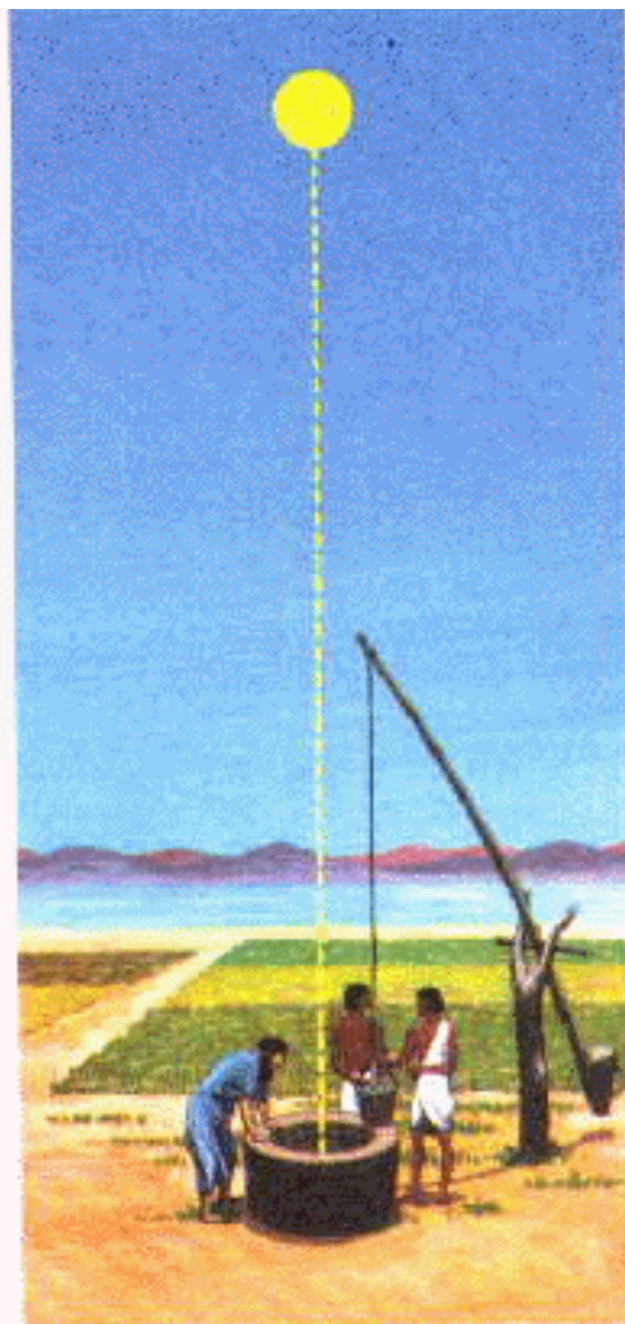
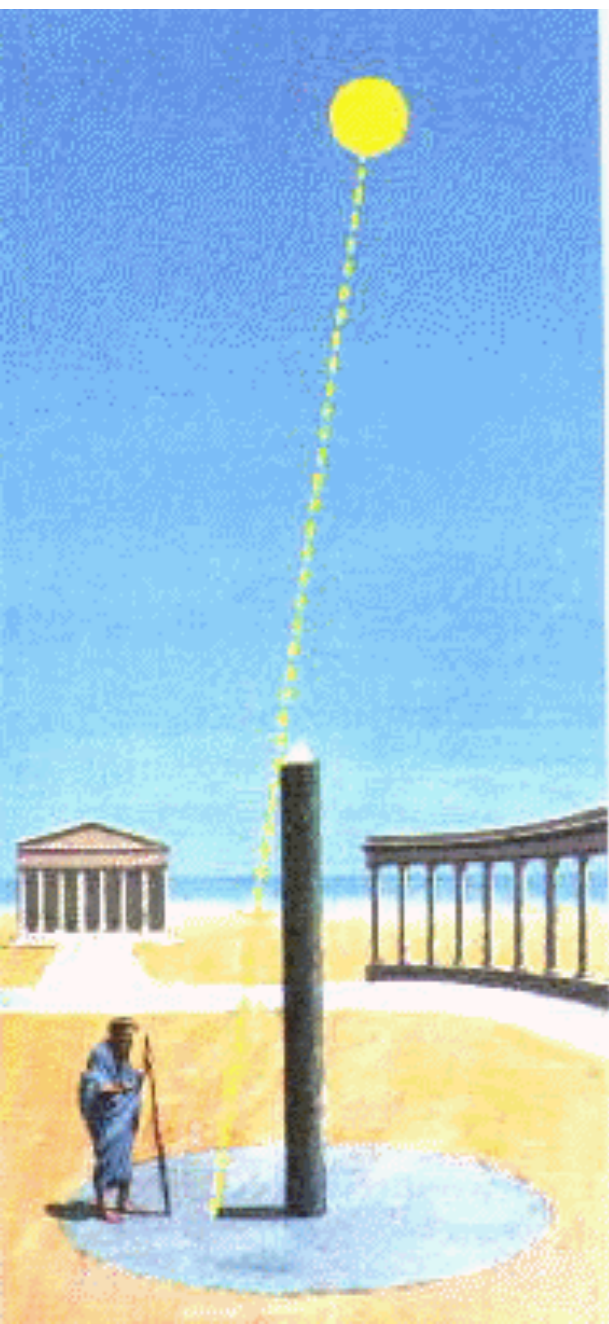
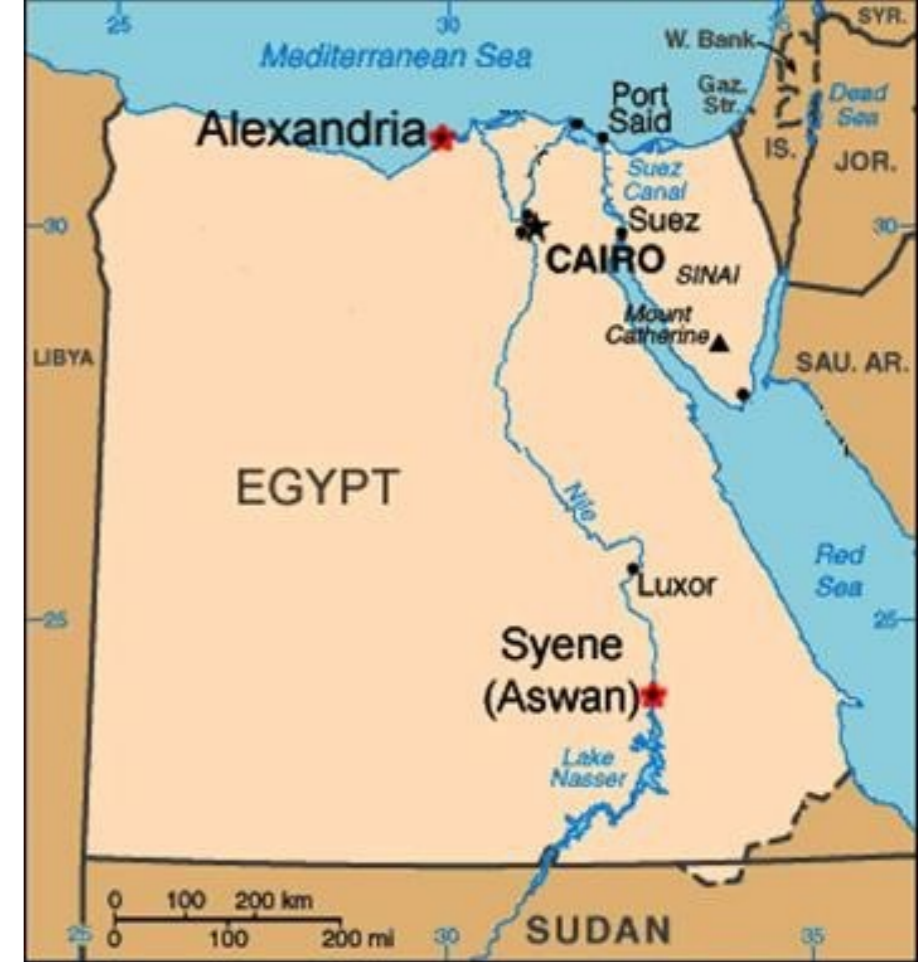


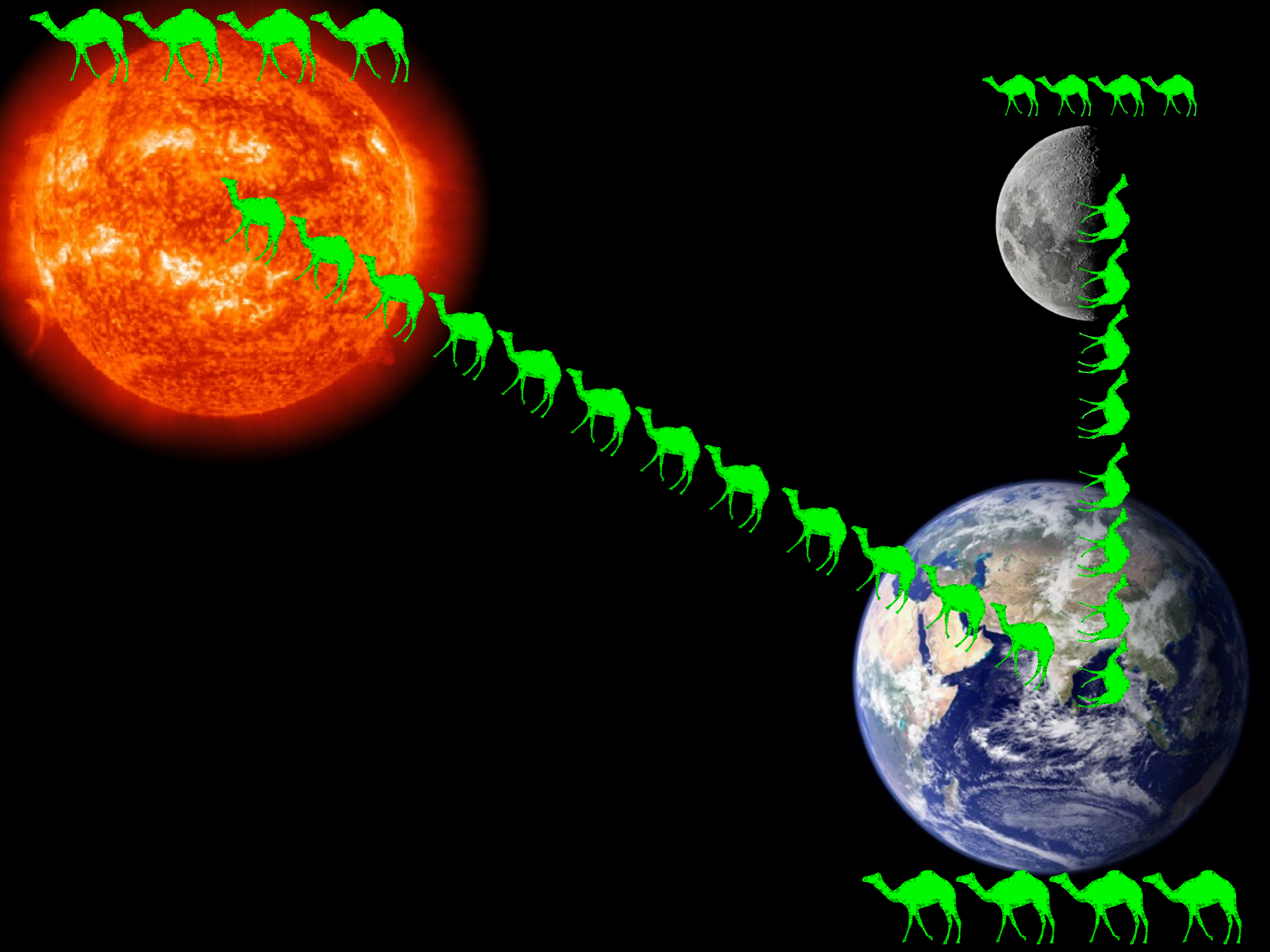






Eratosthenes' measurement of the circumference of the earth (c. -240)





ATHENS

Socrates
Plato
Aristotle

MACEDONIA

Alexander
"The Great"

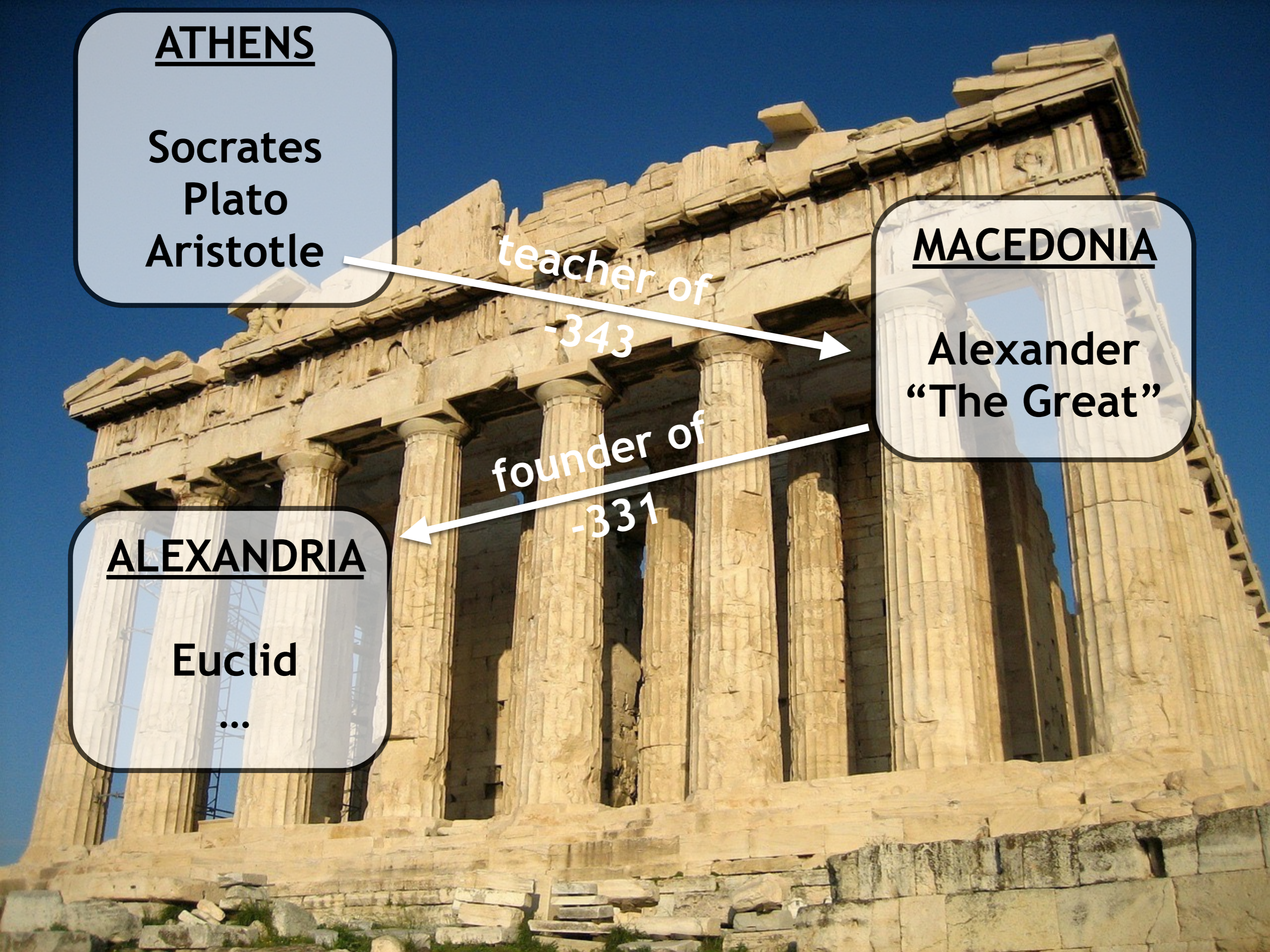
teacher of
-343

founder of
-331

ALEXANDRIA

Euclid

...



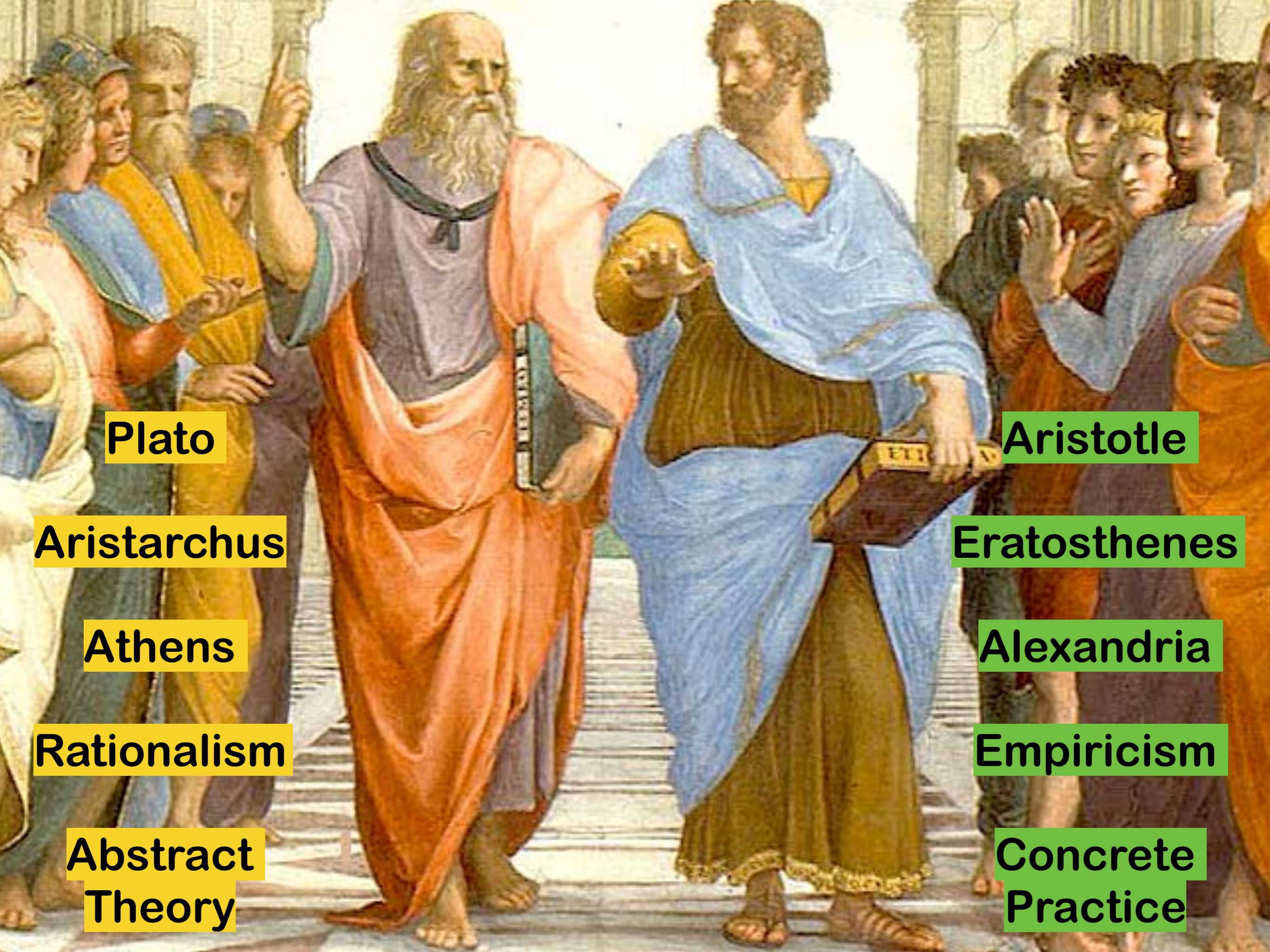


Aristarchus of Samos (c. -310 – -230)



Eratosthenes of Cyrene (-276 – -194)

...VOD QVAMDIV IN CORPORE HABITAMVS, PEREGRINAMVR A DOMINO; PER
...TEREA CONFIDIMVS ET PEROPTAMVS PEREGRINARI A CORPORE, ET ES
...EM SIVE PEREGRINI SVMVS, SIVE INCOLAE, VT ILLI PLACEAMVS. 2. Corinth. 5.



Plato

Aristotle

Aristarchus

Eratosthenes

Athens

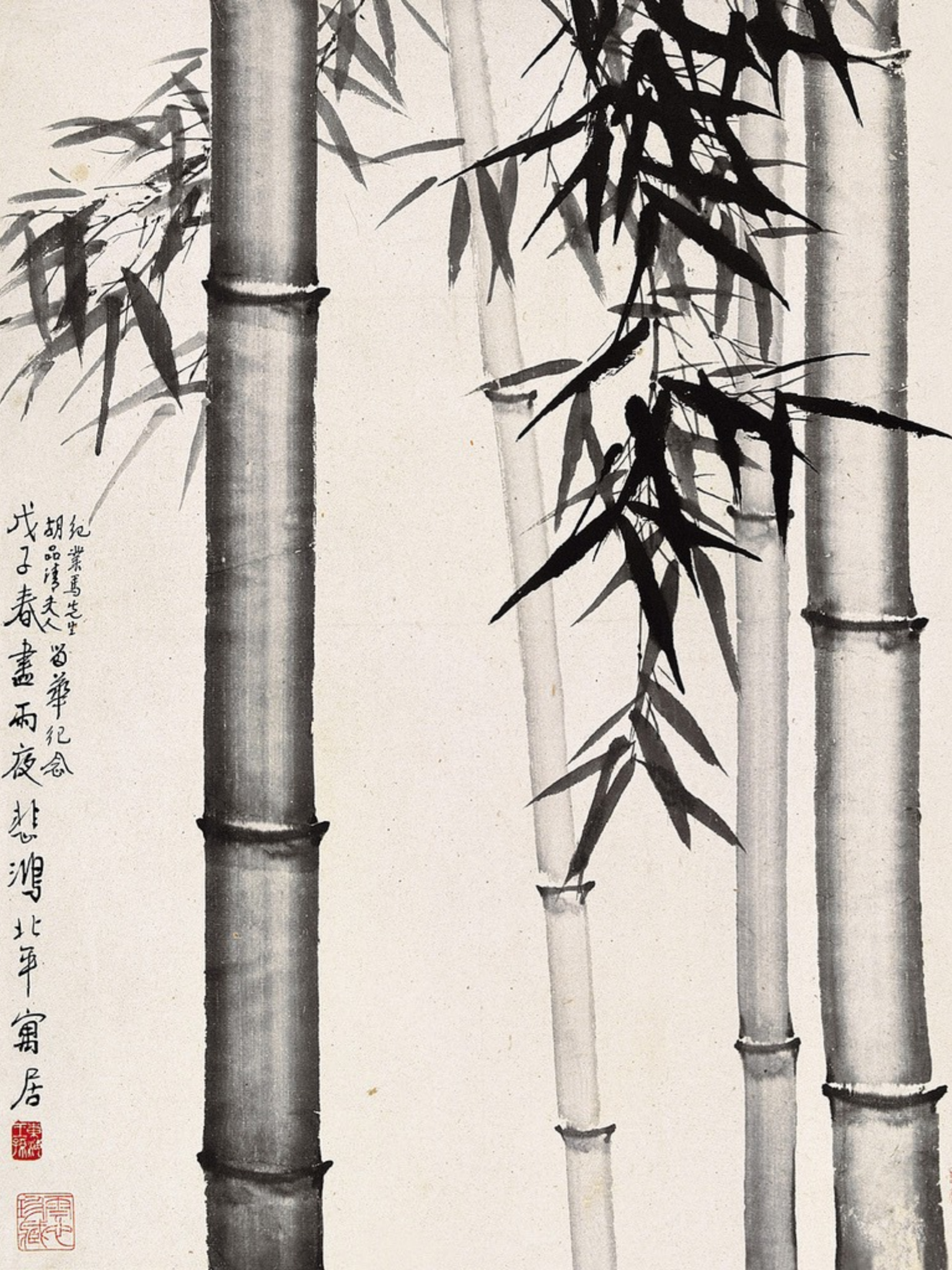
Alexandria

Rationalism

Empiricism

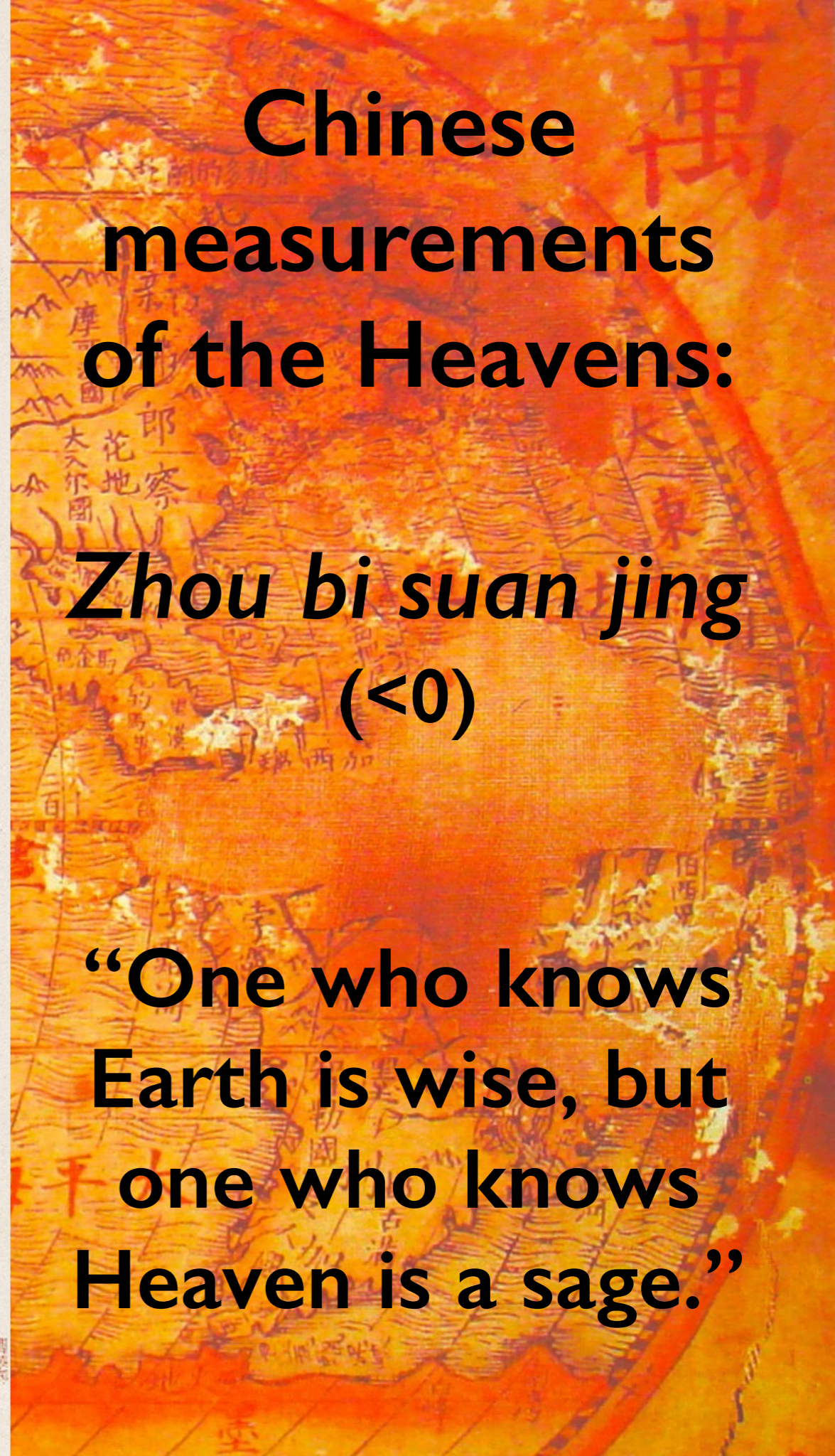
**Abstract
Theory**

**Concrete
Practice**



純業馬先生
胡品清夫人
為華紀念
戊子春畫雨夜
悲鴻

北平寓居



Chinese measurements of the Heavens:

Zhou bi suan jing
(<0)

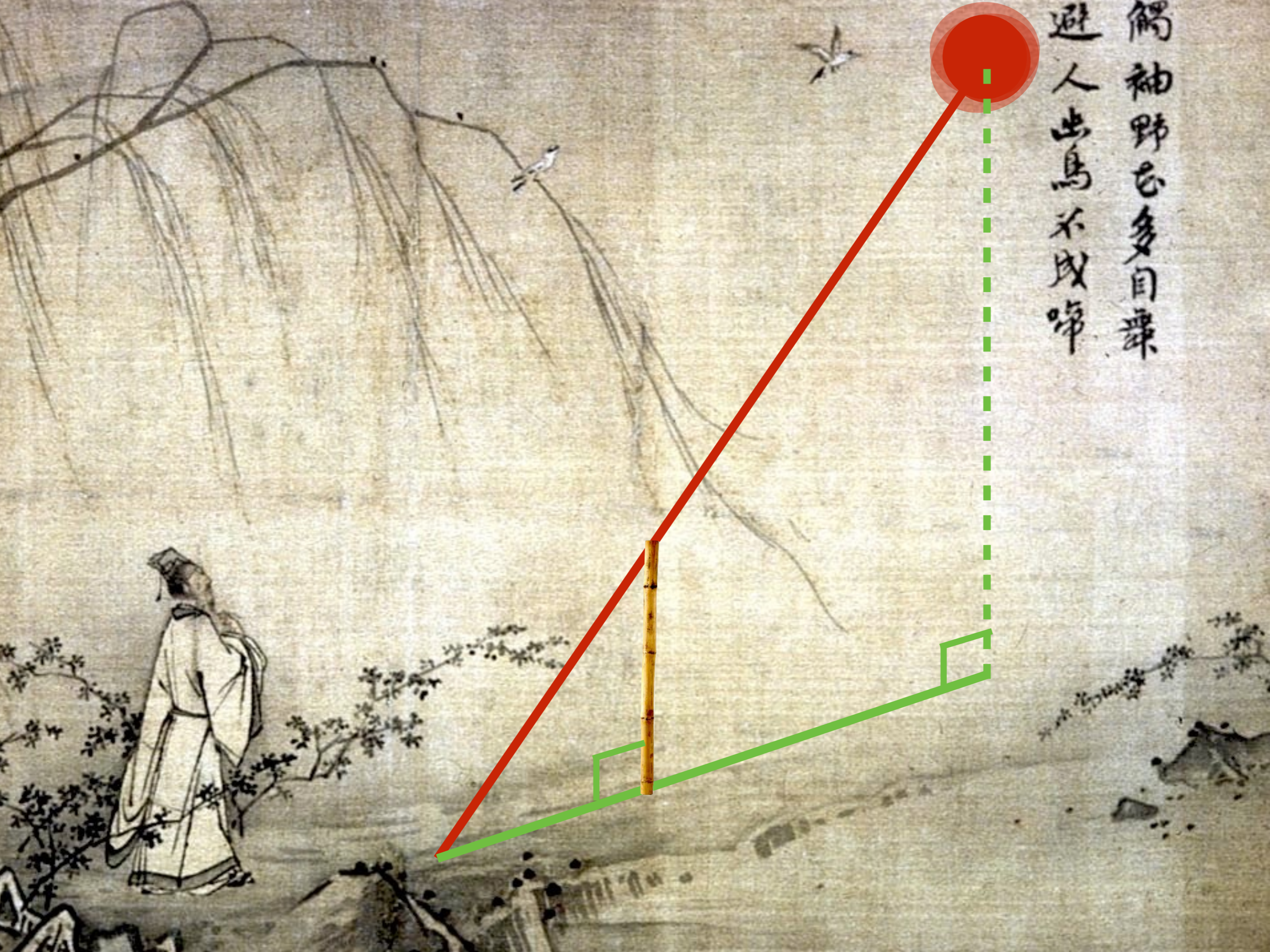
“One who knows
Earth is wise, but
one who knows
Heaven is a sage.”

全





觸袖野志多自棄
避人出鳥不成啼

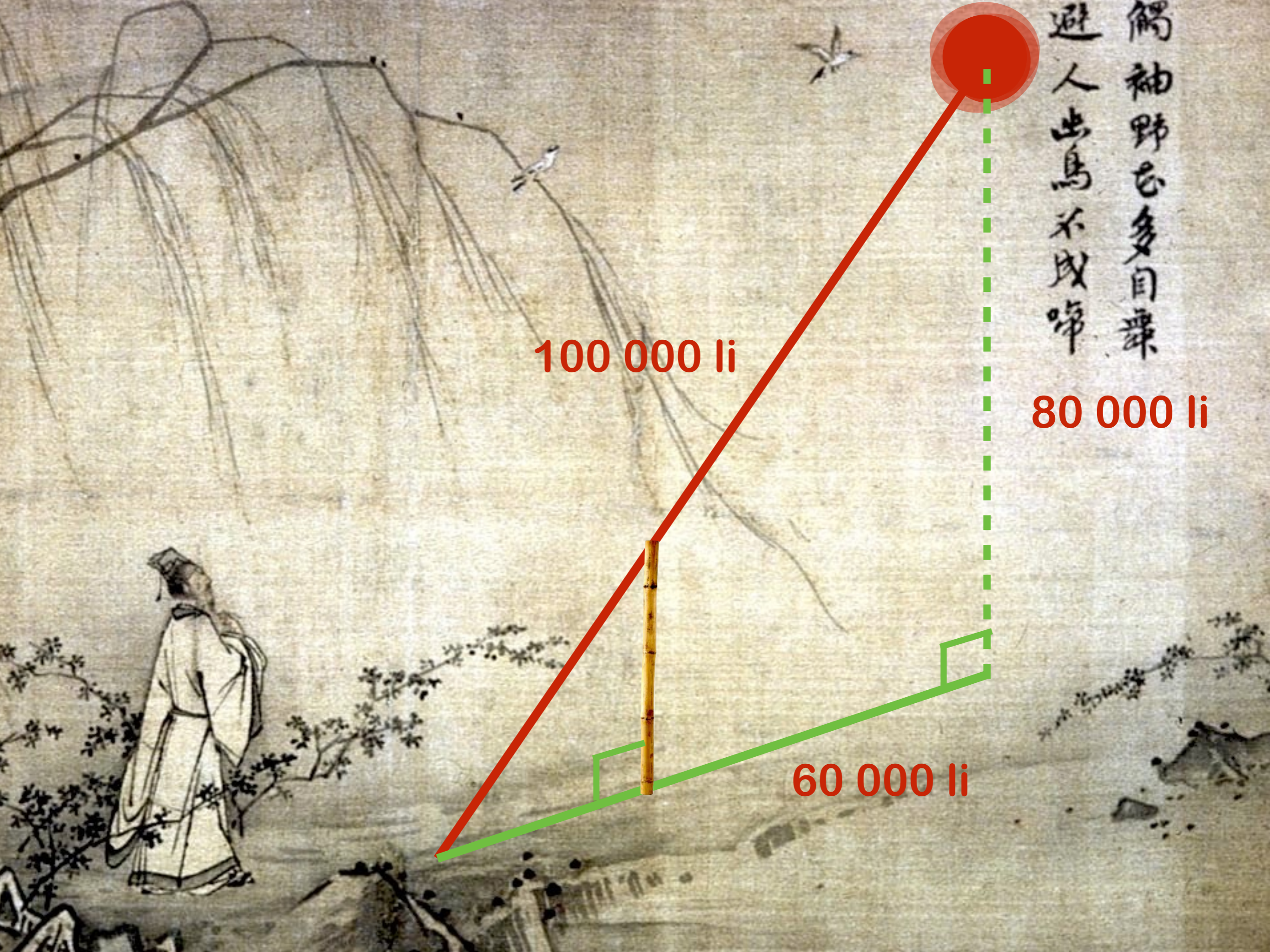


觸袖野志多自棄
避人出鳥不成啼

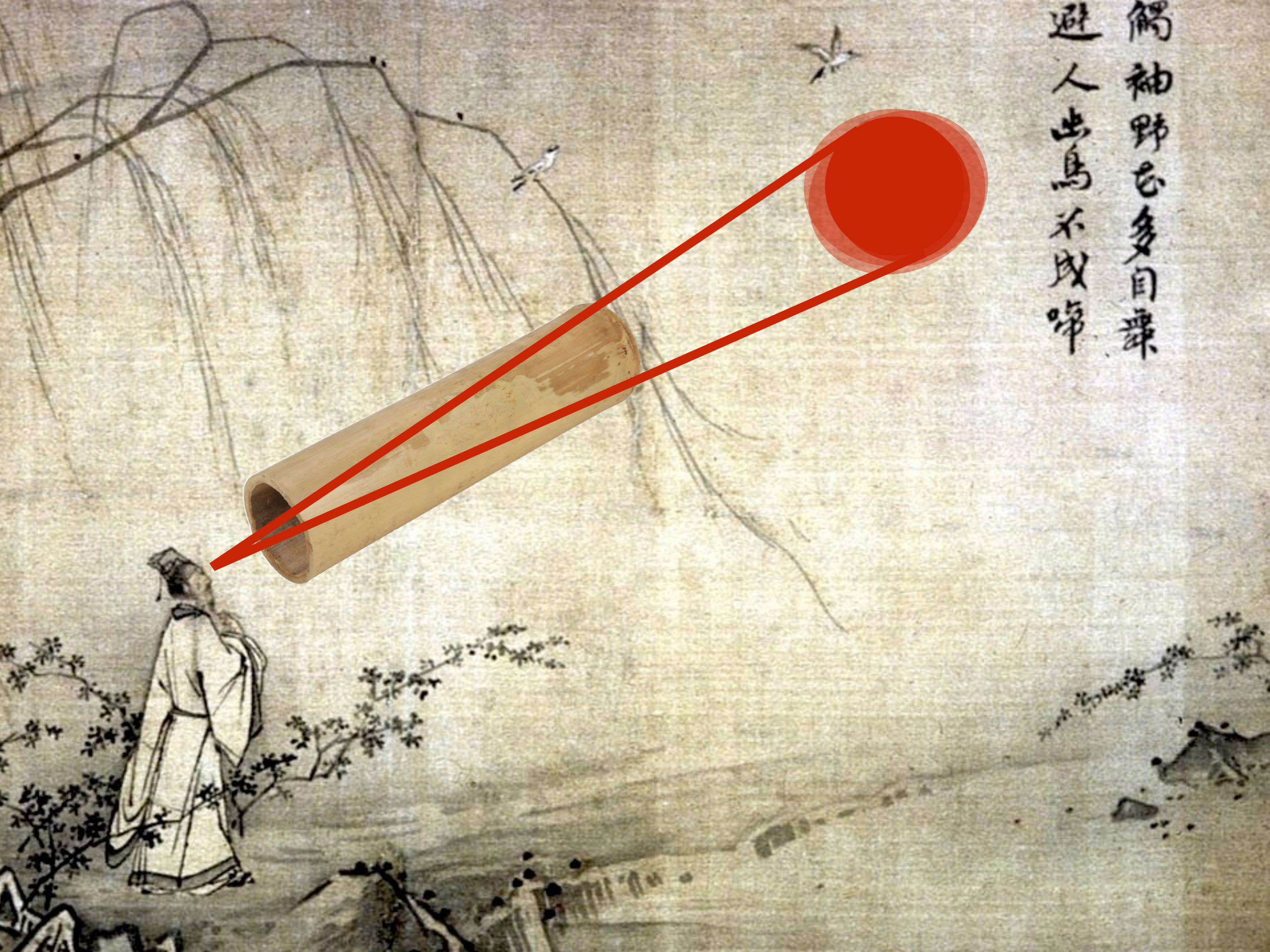
100 000 li

80 000 li

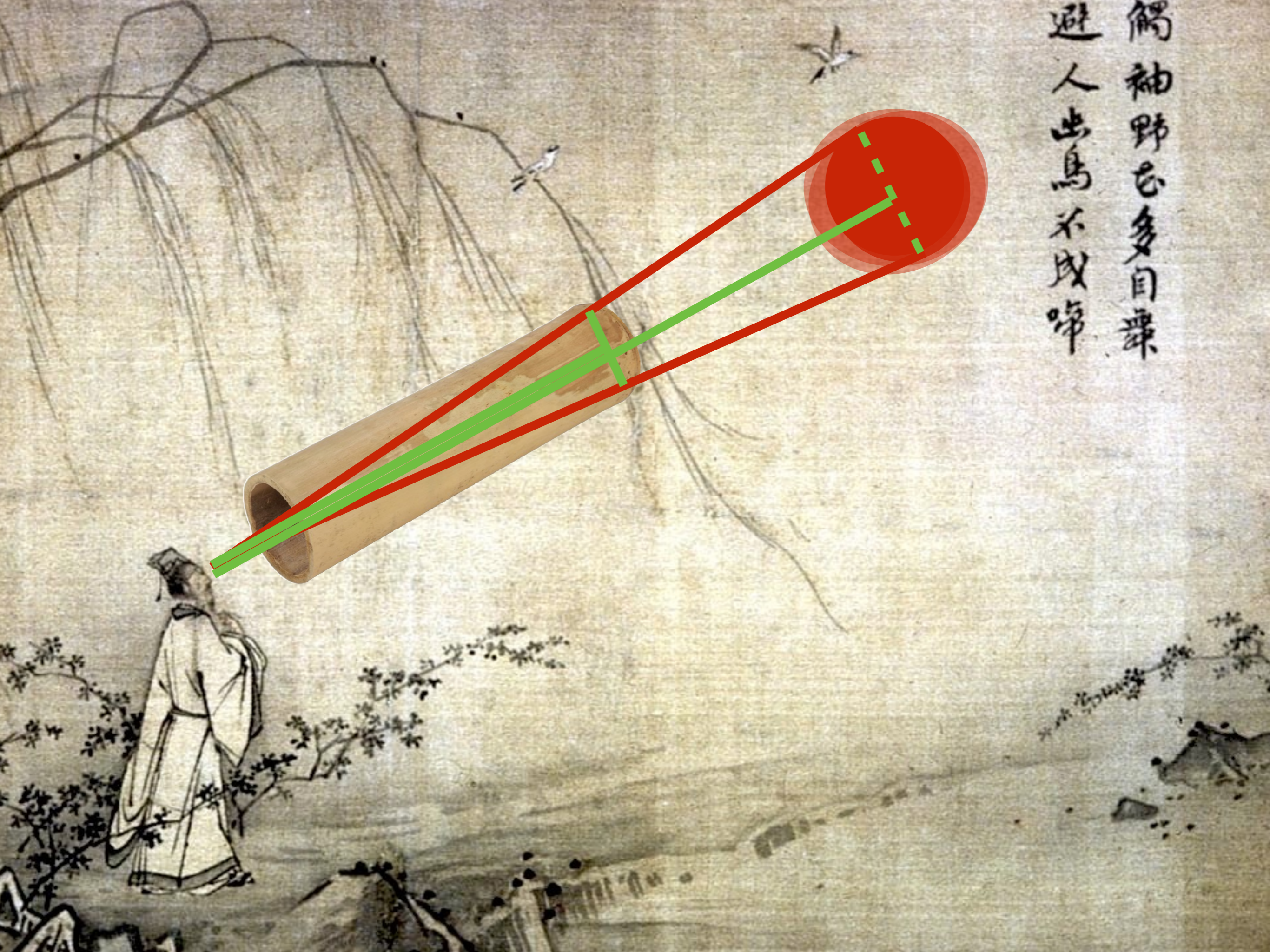
60 000 li



觸袖野鳥多自聒
避人出鳥不成啼



觸袖野鳥多自聒
避人出鳥不成啼



Biruni, Book of the Determination of Coordinates of Localities, Kitab tahdid al-amakin, c. 1025



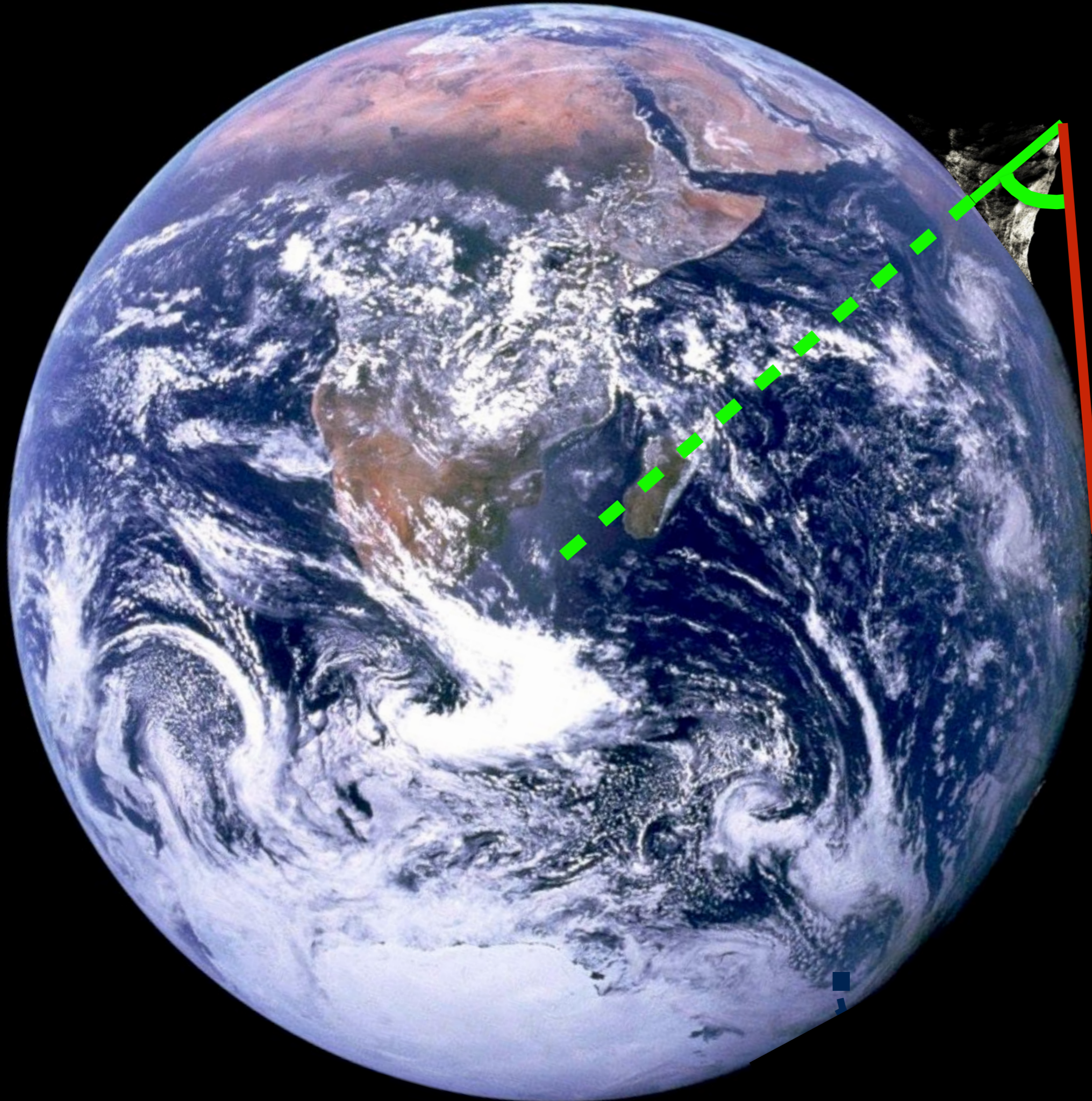
“[A method similar to that of Eratosthenes or the Zhou bi] requires strong command over a vast tract of land and extreme caution is needed from the dangerous treachereries of those spread over it.”

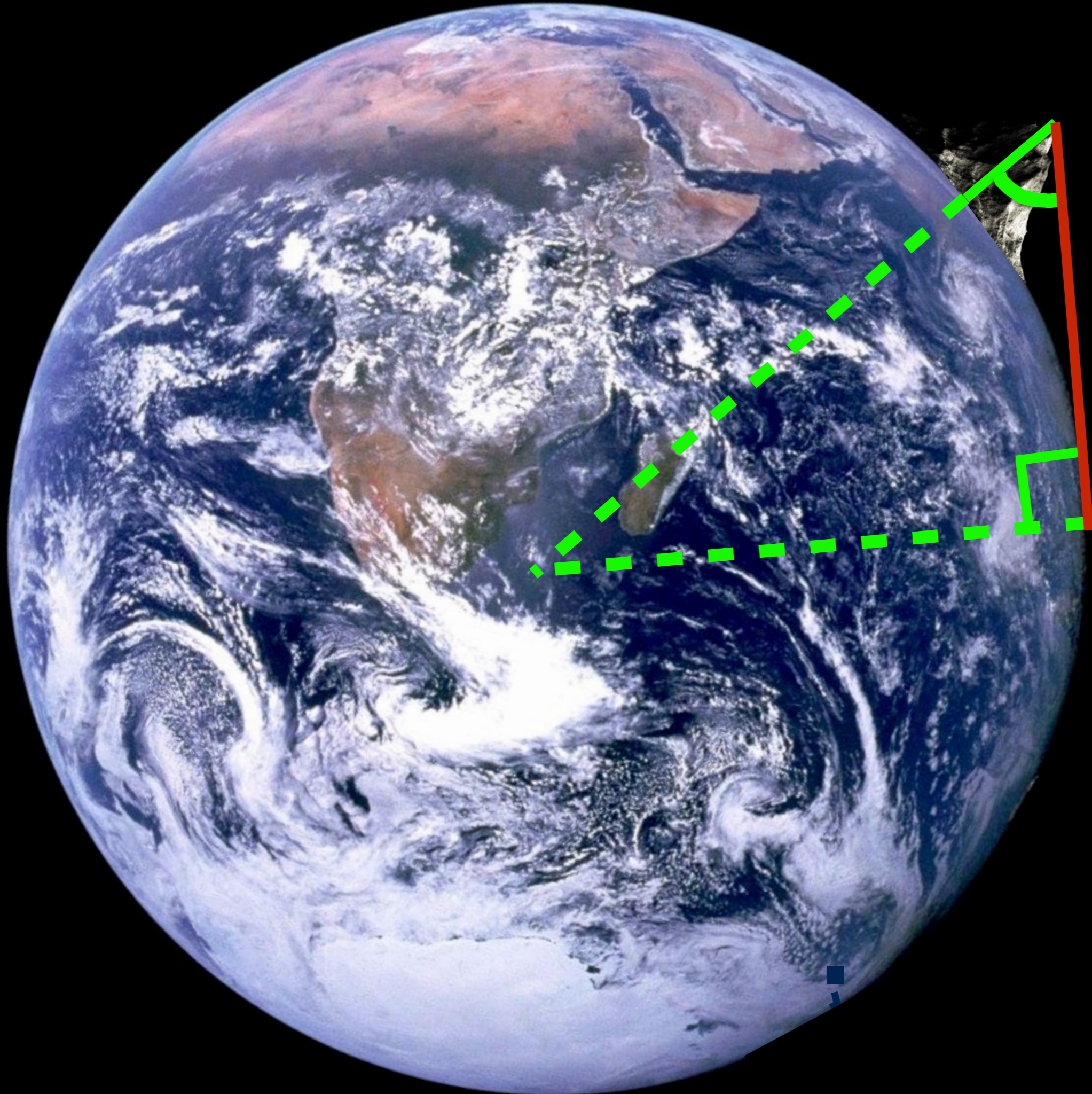
“Here is another method for the determination of the circumference of the earth. It does not require walking in deserts.”

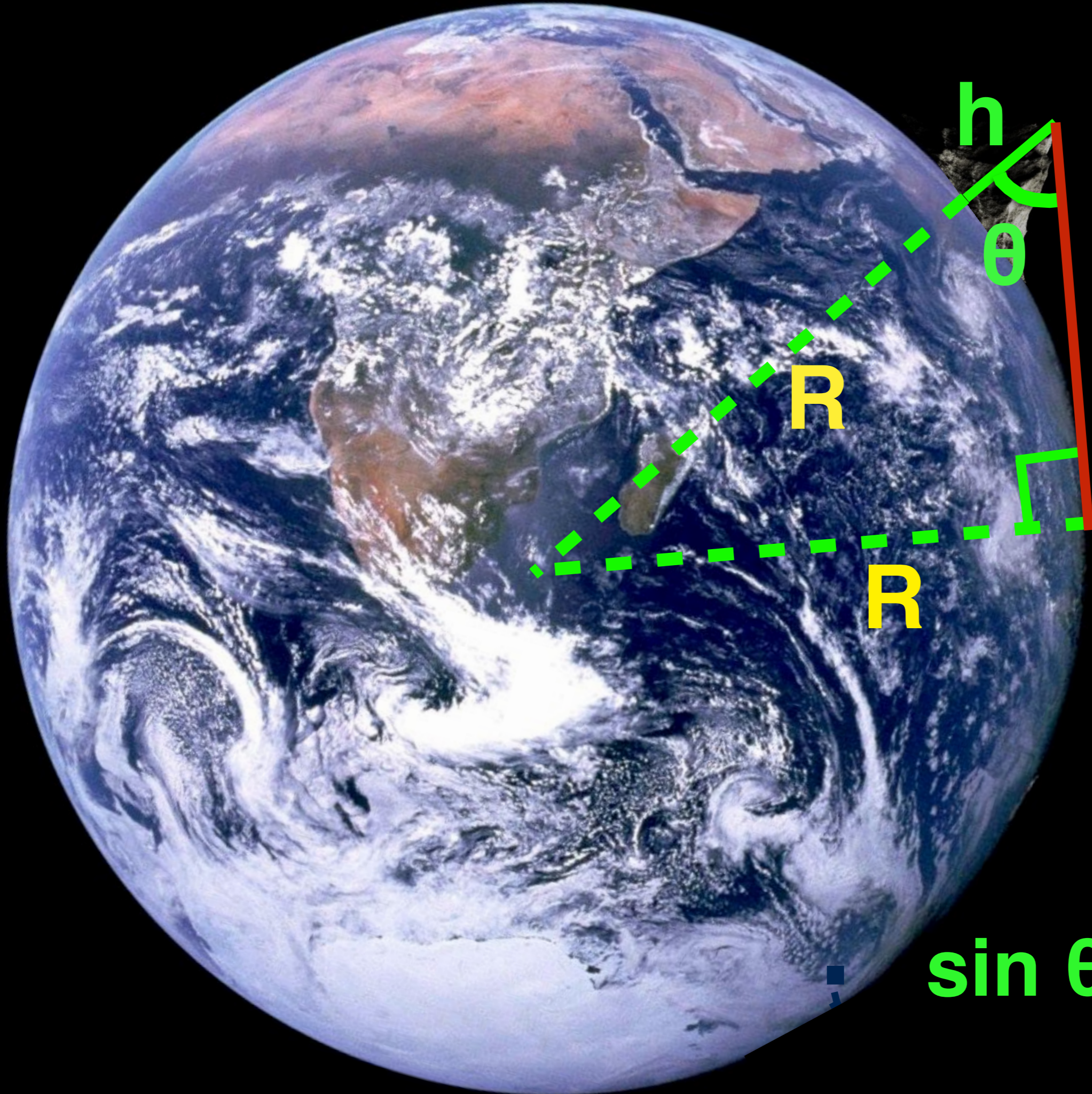






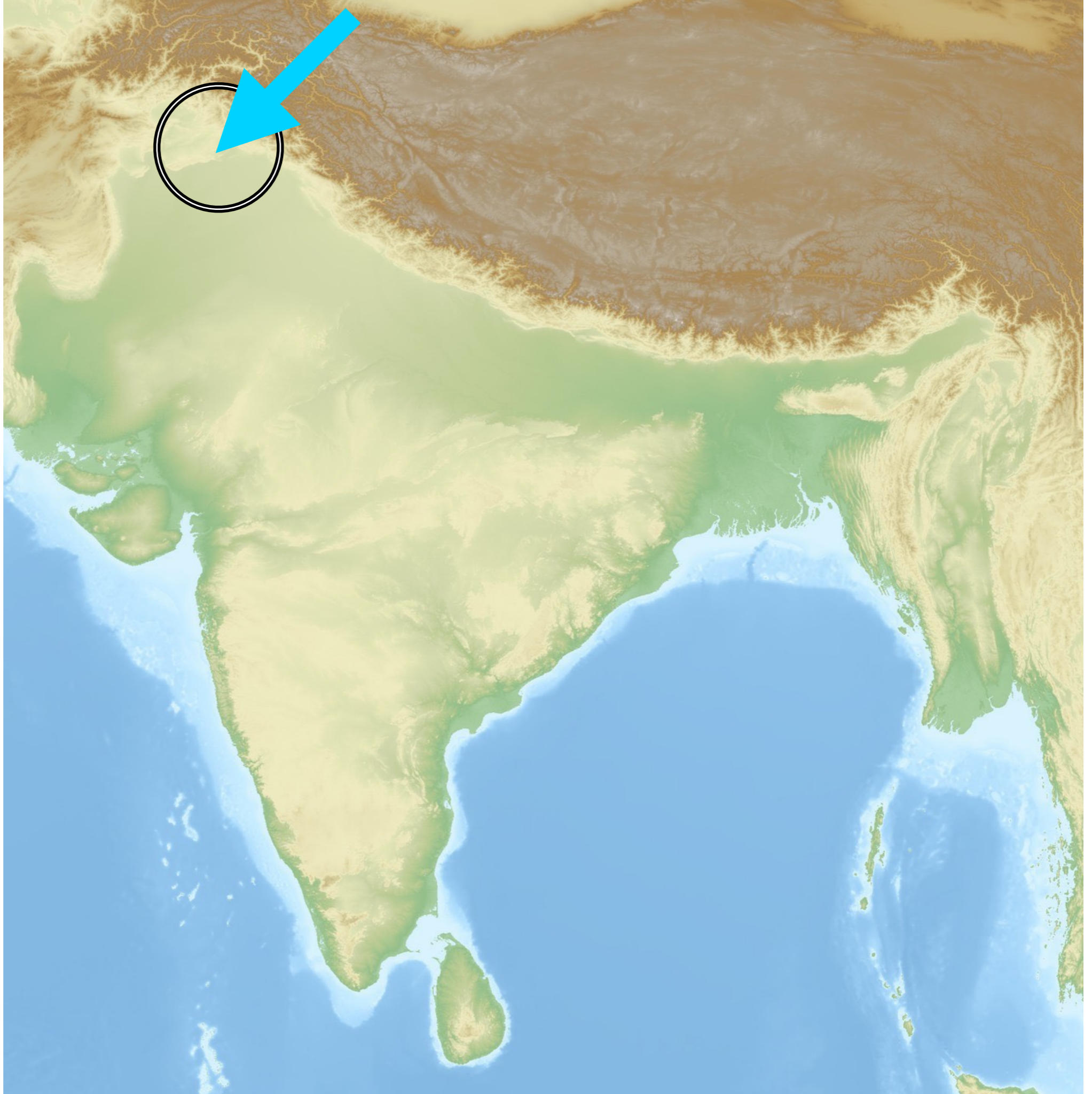
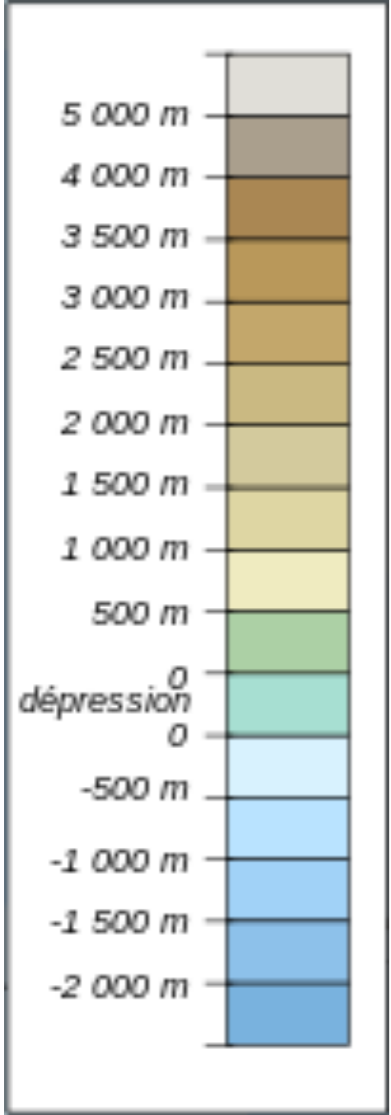


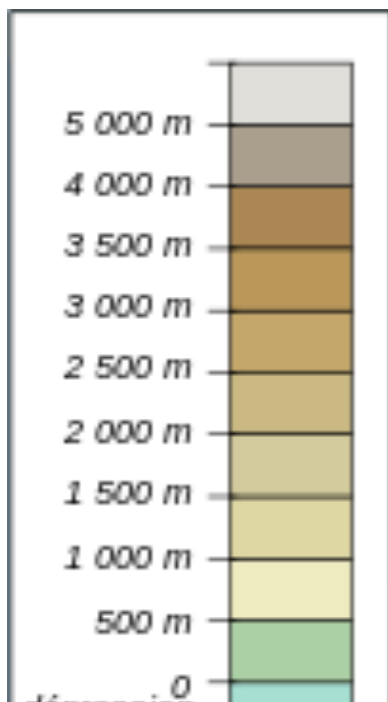




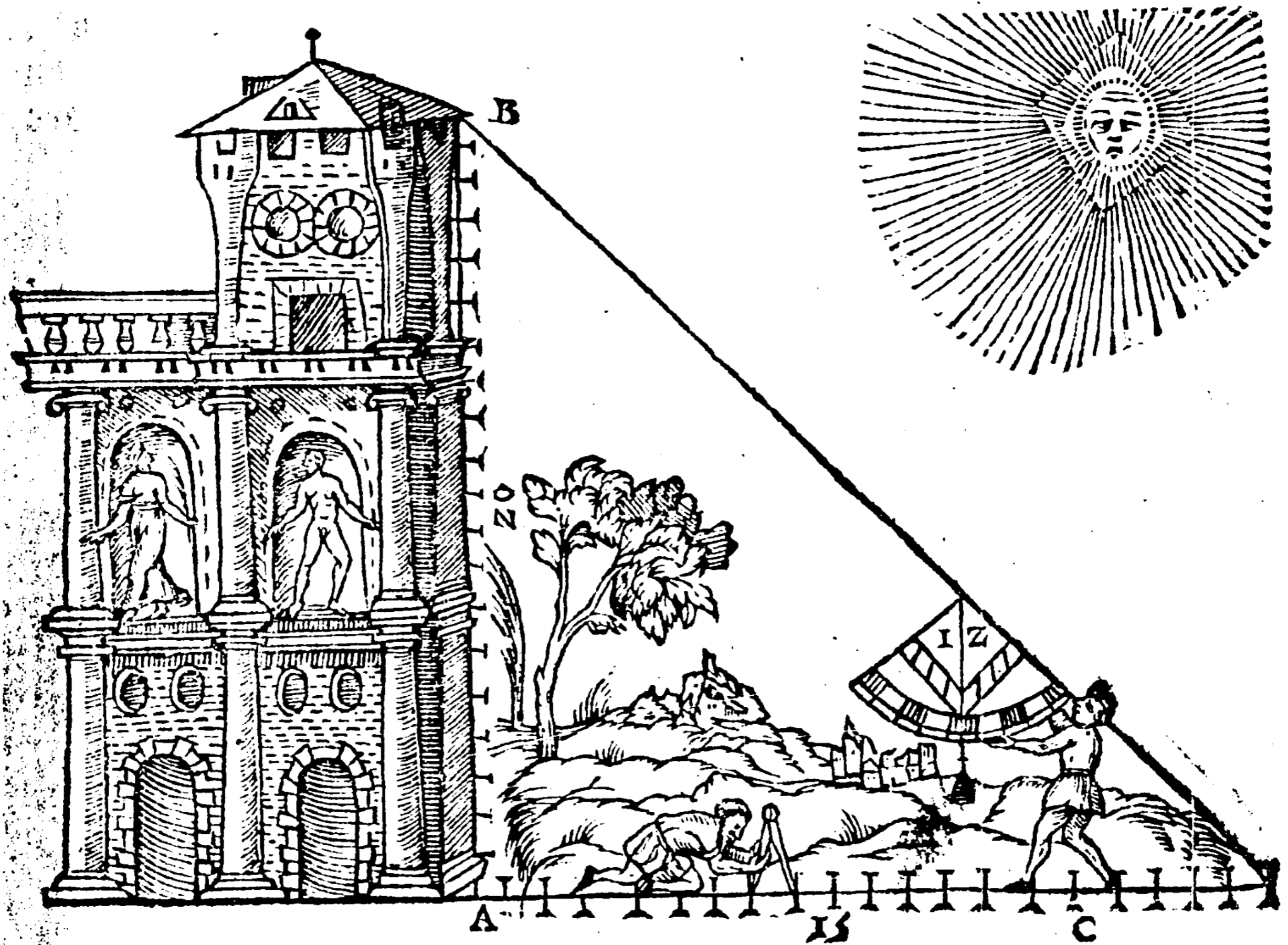
$$\sin \theta = \frac{R}{R + h}$$



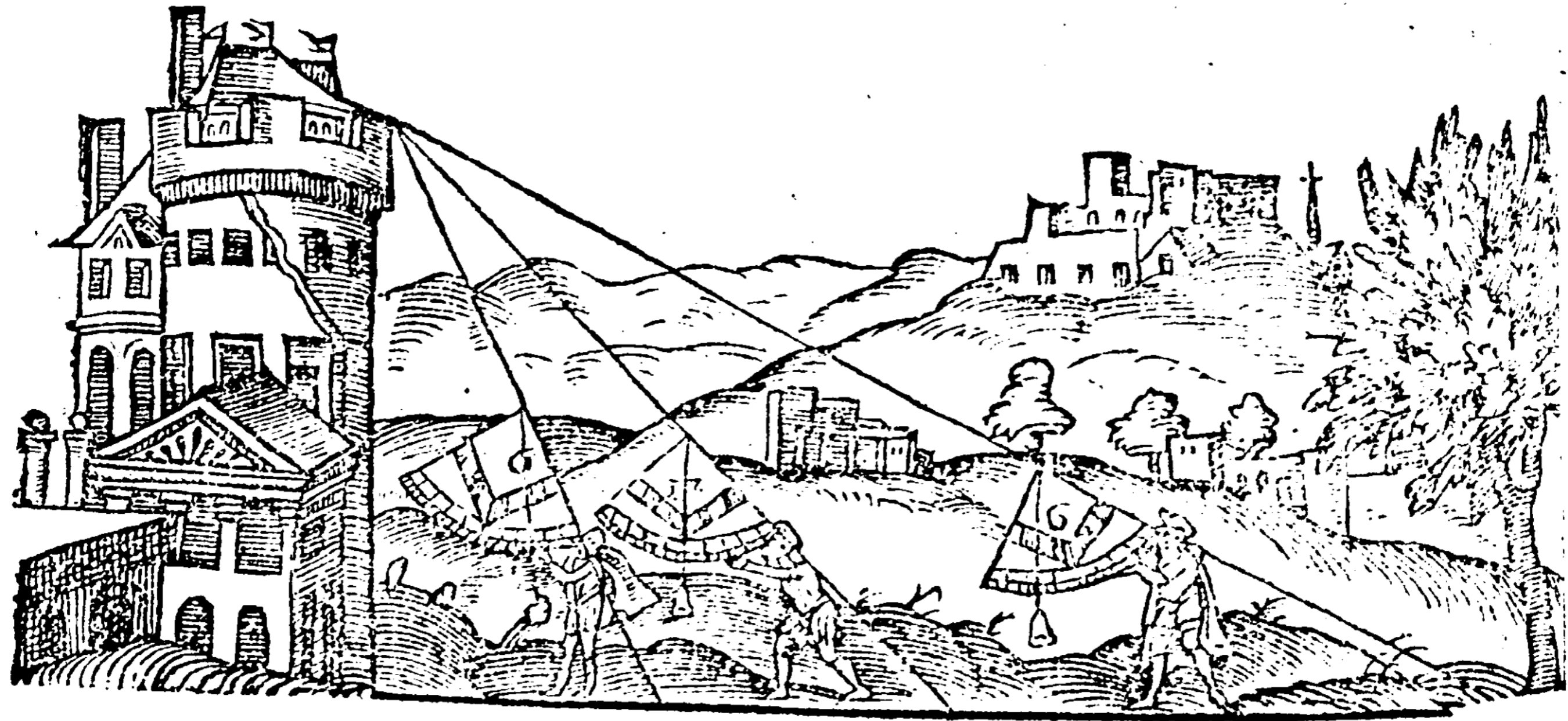




Without shadowe or any supputation by your quadrant
geometricall to take heigthes approachable.

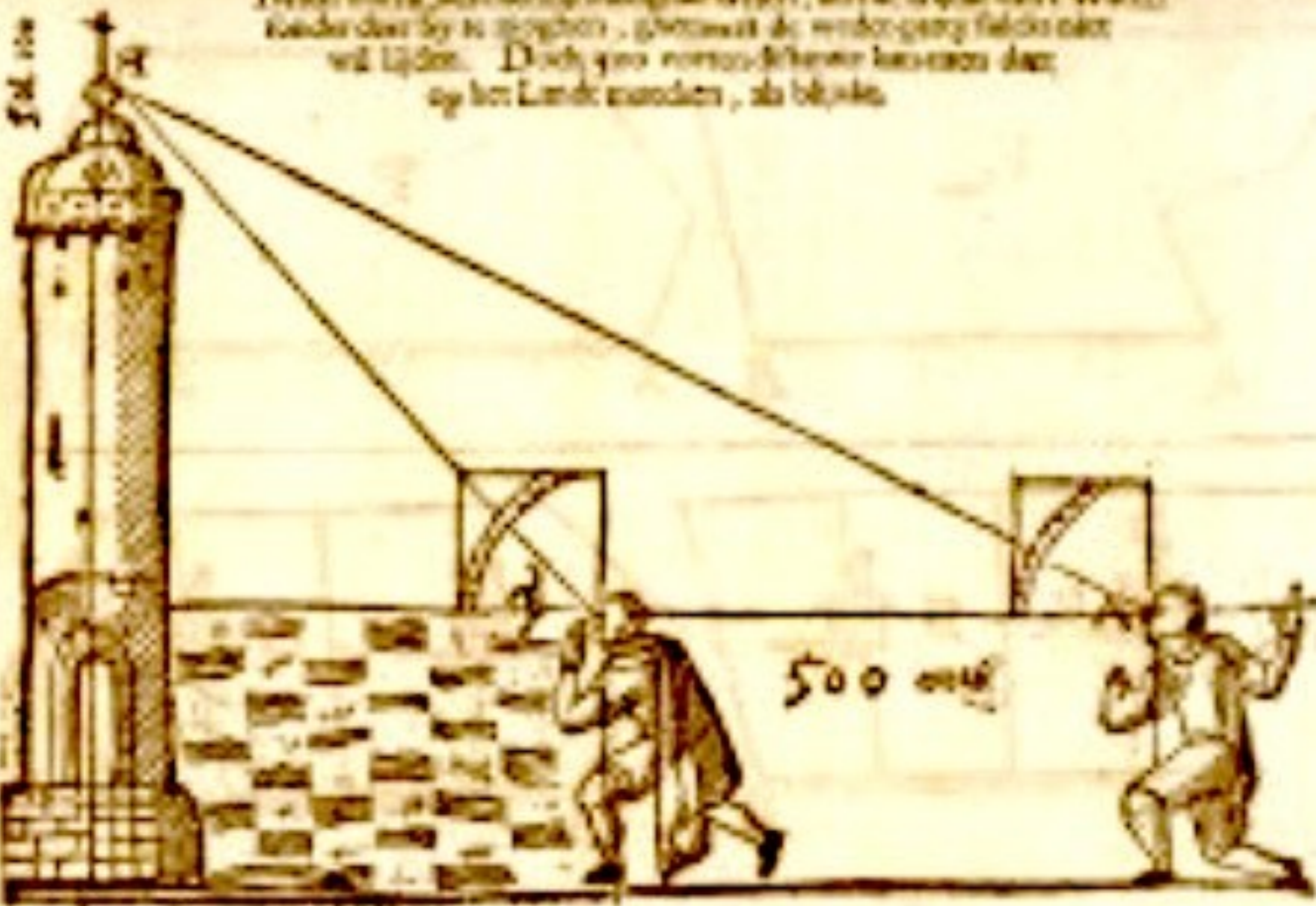


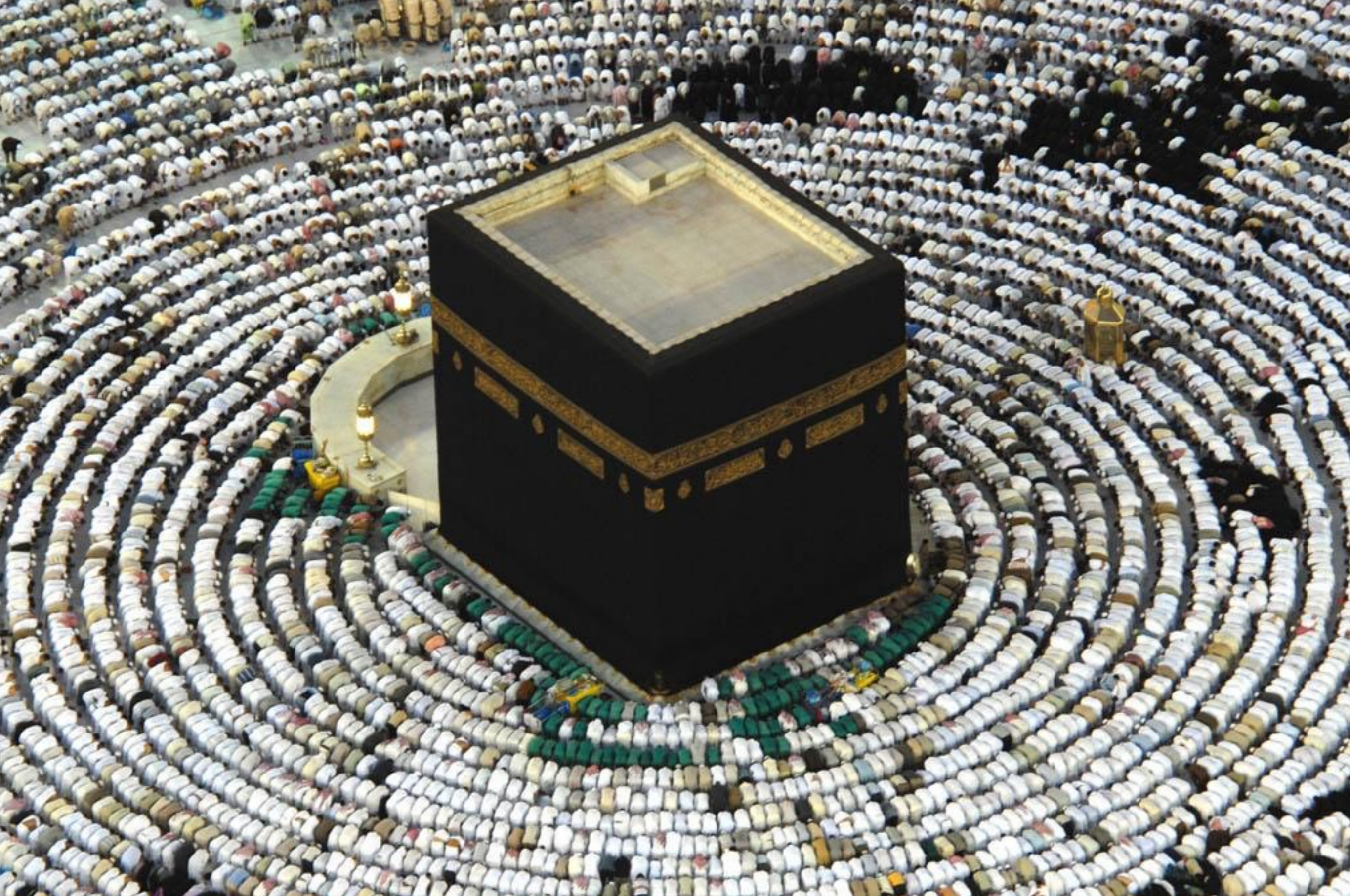
With the ayde of two places to search out
improcheable heightes.



Itz ist zu sehen, wie man die Höhe der Thür, wenn die Waage nicht
kann, durch die Höhe der Thür, wenn die Waage nicht
wird, durch die Höhe der Thür, wenn die Waage nicht
und bei Lande messen, da bleibt.

fol. 100





Biruni: “If the investigation of distances between towns, and the mapping of the habitable world, ... serve none of our needs except the need for correcting the direction of the qibla we should find it our duty to pay all our attention and energy for that investigation.”



قوله
الذي
هو



« زیباسازی شهر »

ERATOSTHENES
BATAVVS

De Terræ ambitus vera
quantitate,

A

WILLEBRORDO SNELLIO,



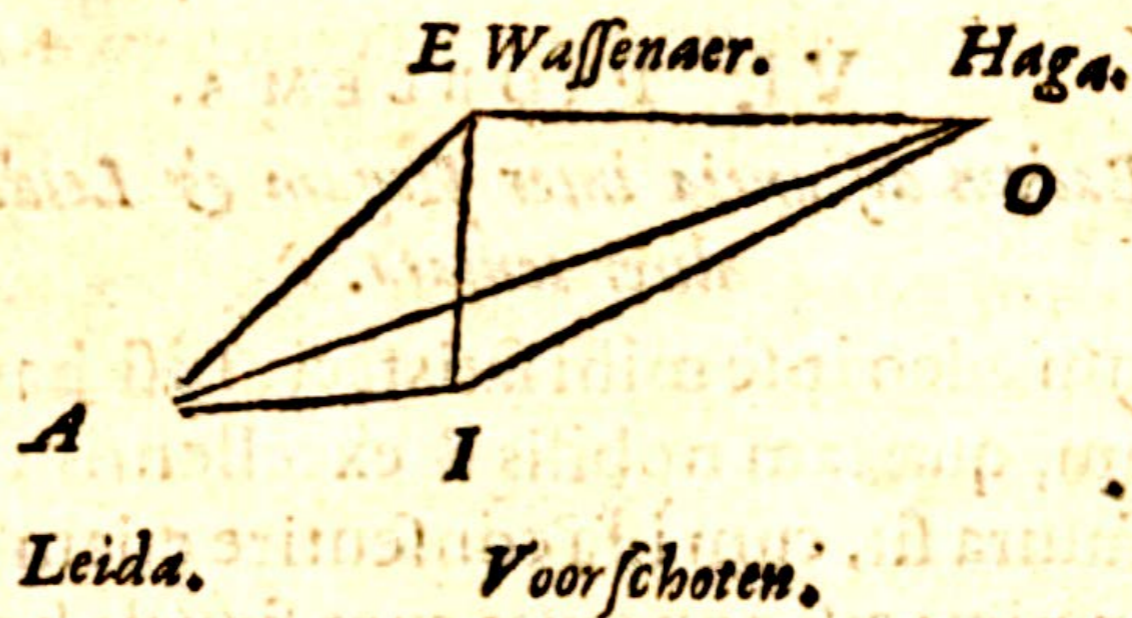
ERATOSTHENES BATAVVS

De Terræ ambitus vera
quantitate,

A
WILLEBRORDO SNELLIO,



V. PROBLEMA.
Distancia Haga & Leida.



A New Map of the
UNITED PROVINCES
 OR
NETHERLANDS &c.
 By Herman Moll Geographer.



English Miles

NORTH



SEA.

- Chief Cities
- Cities
- * Universities
- Gentlemens Houses
- △ Villages
- Artificial Canals
- a. The Zype
- b. The Waert
- c. Schermer
- d. Beemster
- e. Wormer
- f. Purmer
- g. Marken I.
- h. Naender Meer
- i. Vecht R.
- k. Rhein R.



GEMMA FRISIUS, TYCHO BRAHE AND SNELLIUS AND THEIR TRIANGULATIONS

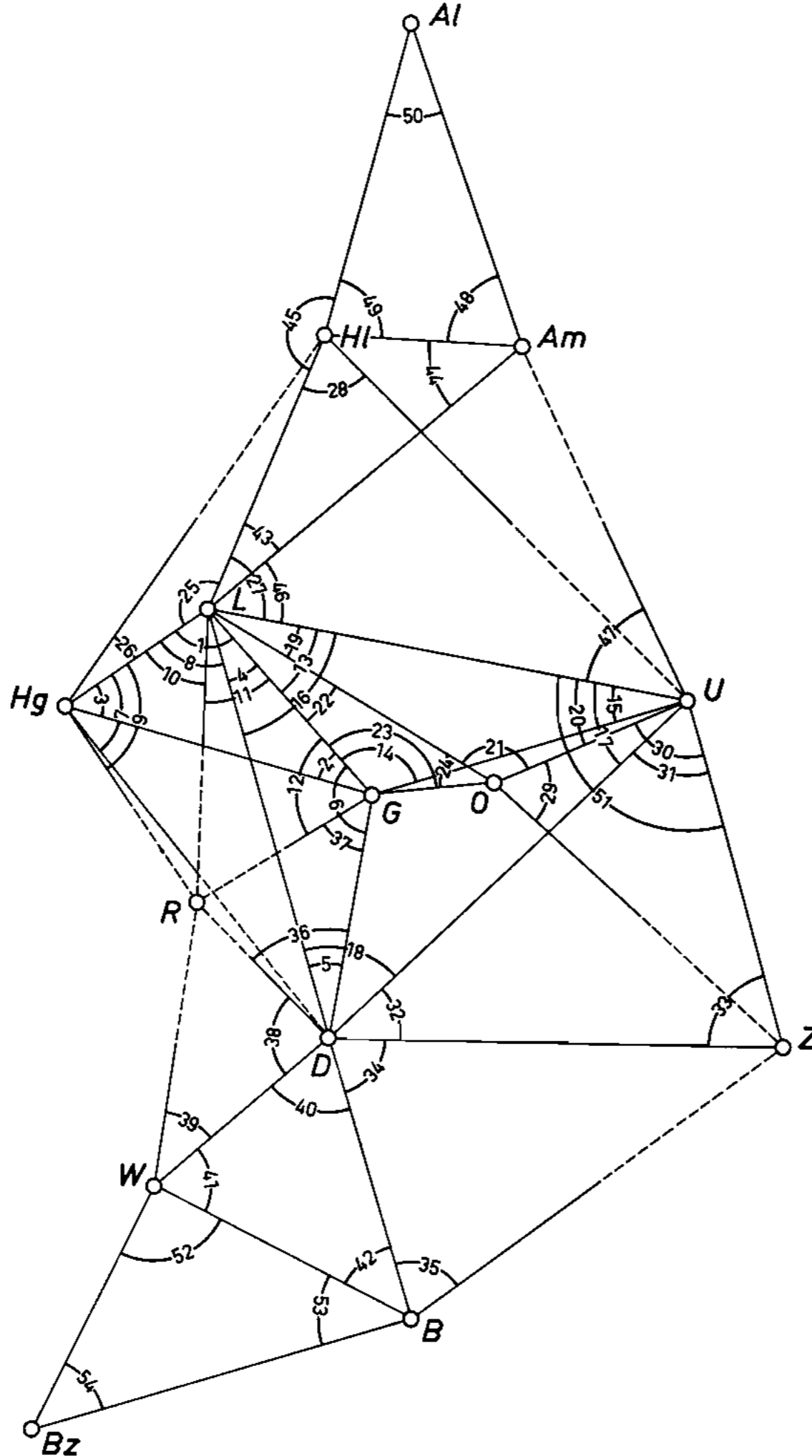
by N. D. HAASBROEK

FORMER LECTURER AT THE TECHNOLOGICAL UNIVERSITY OF DELFT

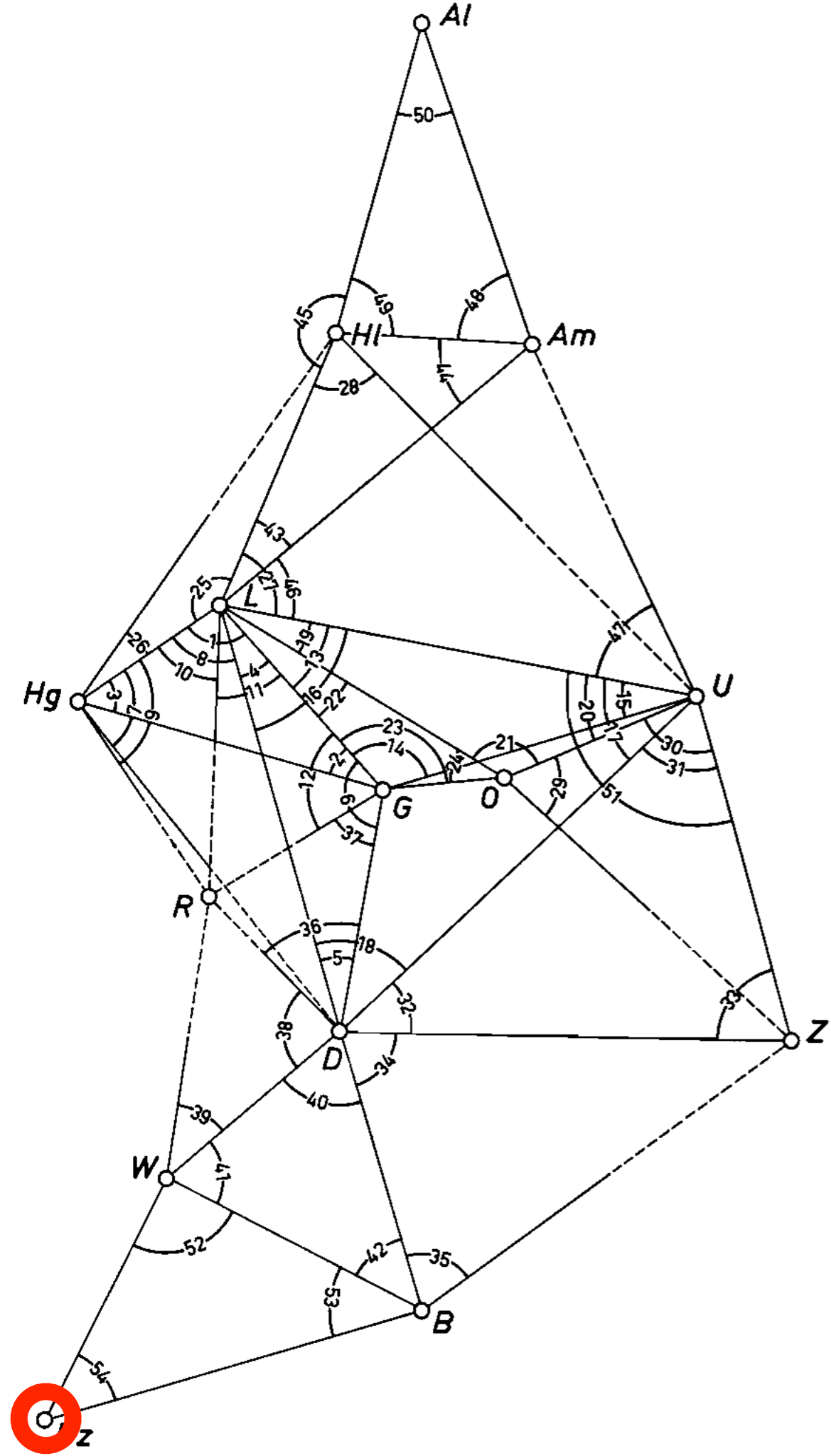
1968

RIJKSCOMMISSIE VOOR GEODESIE, KANAALWEG 4, DELFT, NETHERLANDS

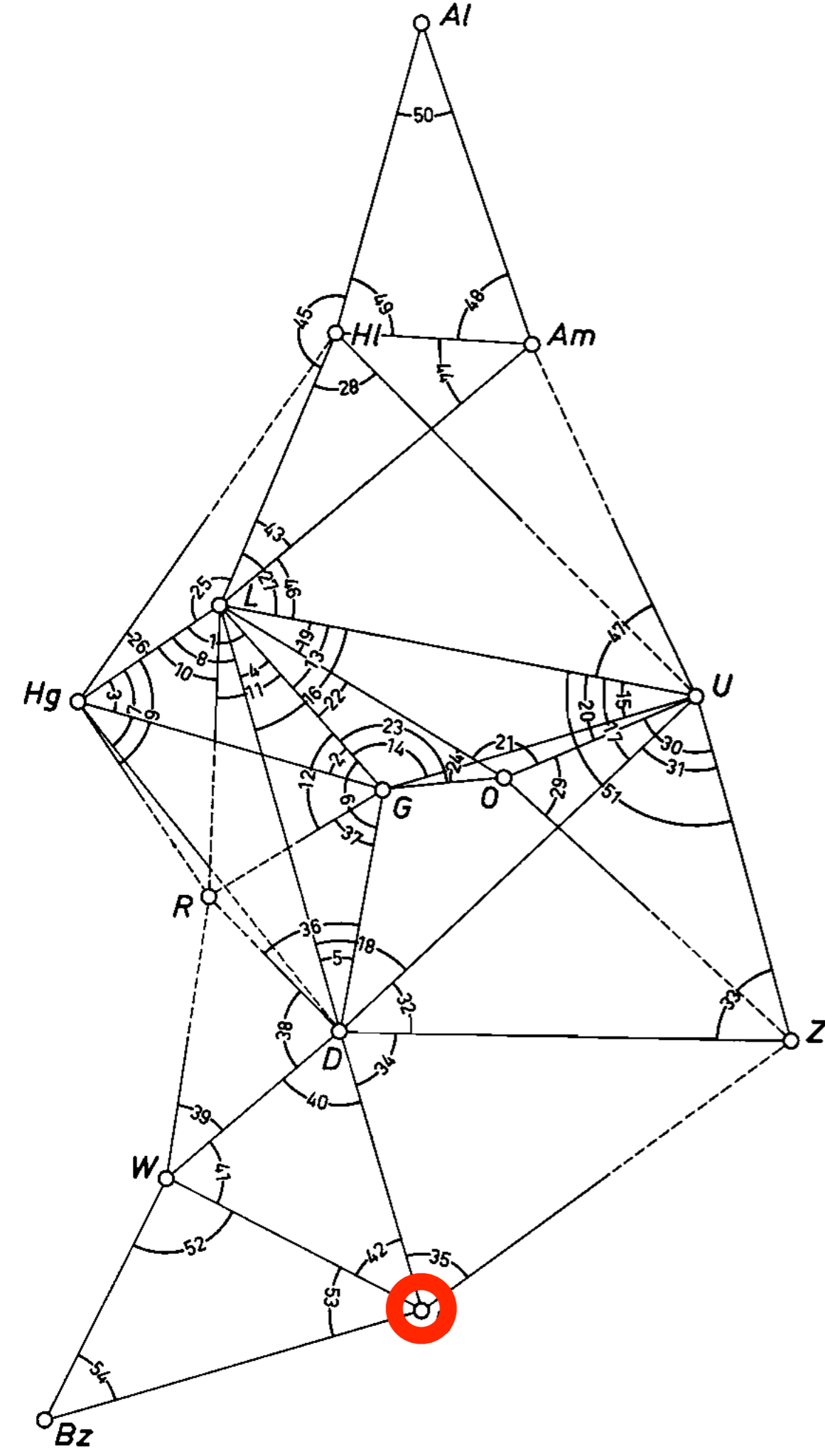
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8	71 31	35	70 14
9	90 18	36	54 12
10	53 40	37	48 15
11	43 36	38	86 19
12	80 00	39	41 10
13	37 40	40	66 11
14	114 48	41	67 51
15	27 32	42	45 59
16	63 26	43	27 11
17	54 08	44	43 18
18	62 28	45	172 11
19	20 26	46	50 38
20	33 53	47	54 00
21	125 43	48	67 45
22	17 23	49	77 55
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24	36 53	51	116 23
25	147 19	52	89 25
26	20 45	53	43 24
27	77 50	54	47 15



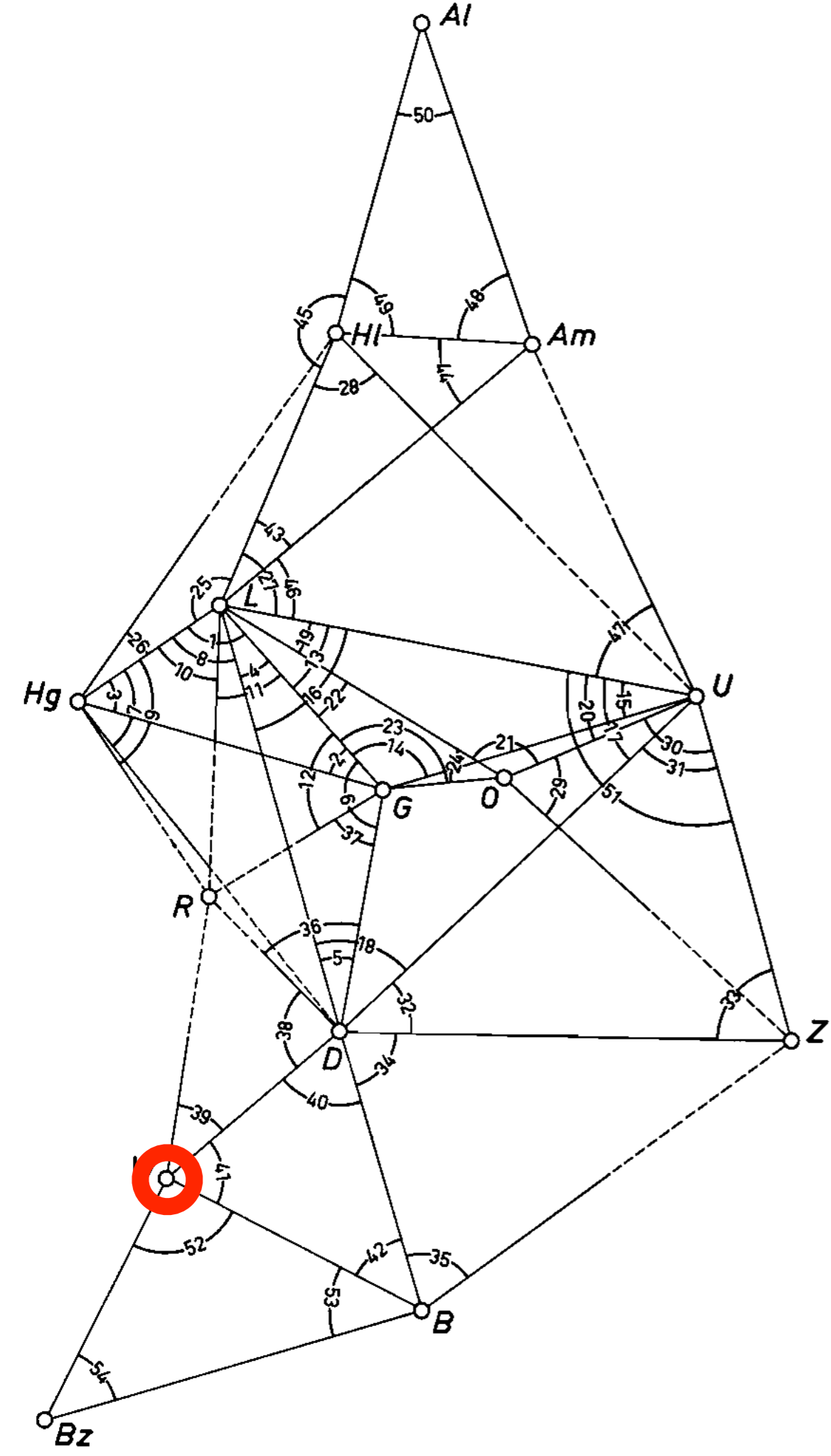
Bergen op Zoom: Hervormde kerk



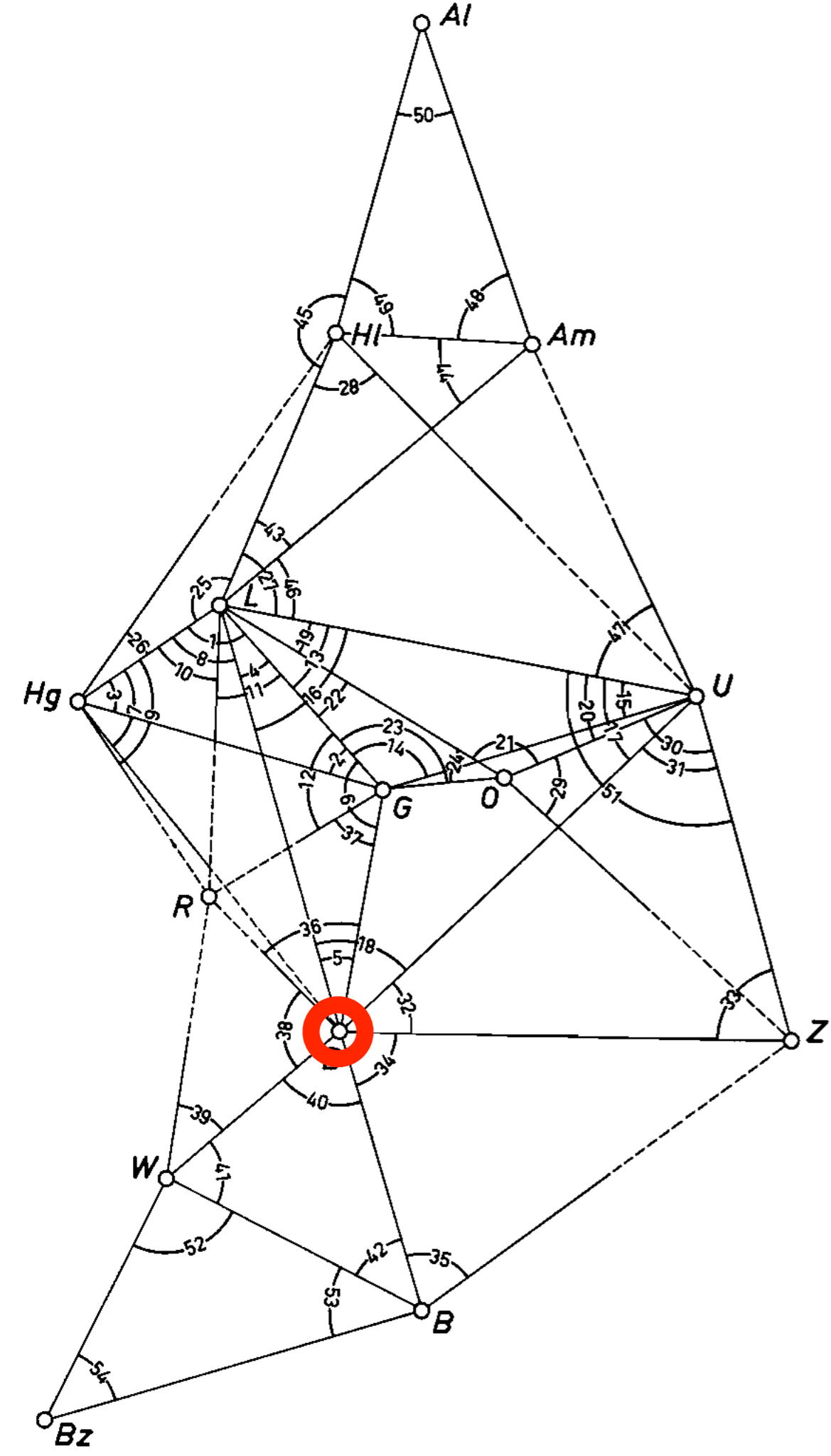
Breda: Onze Lieve Vrouwekerk



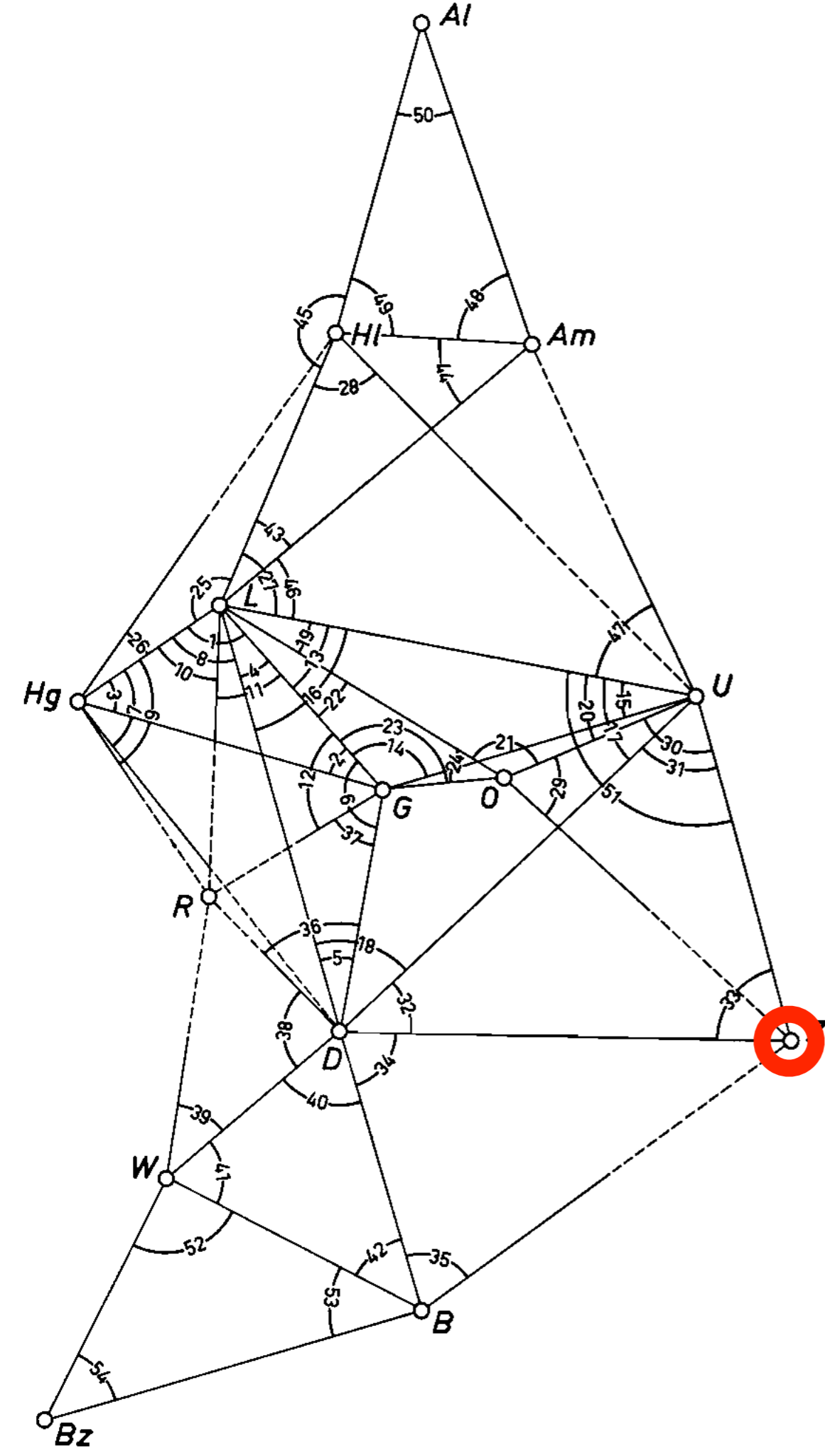
Willemstad: Hervormde kerk



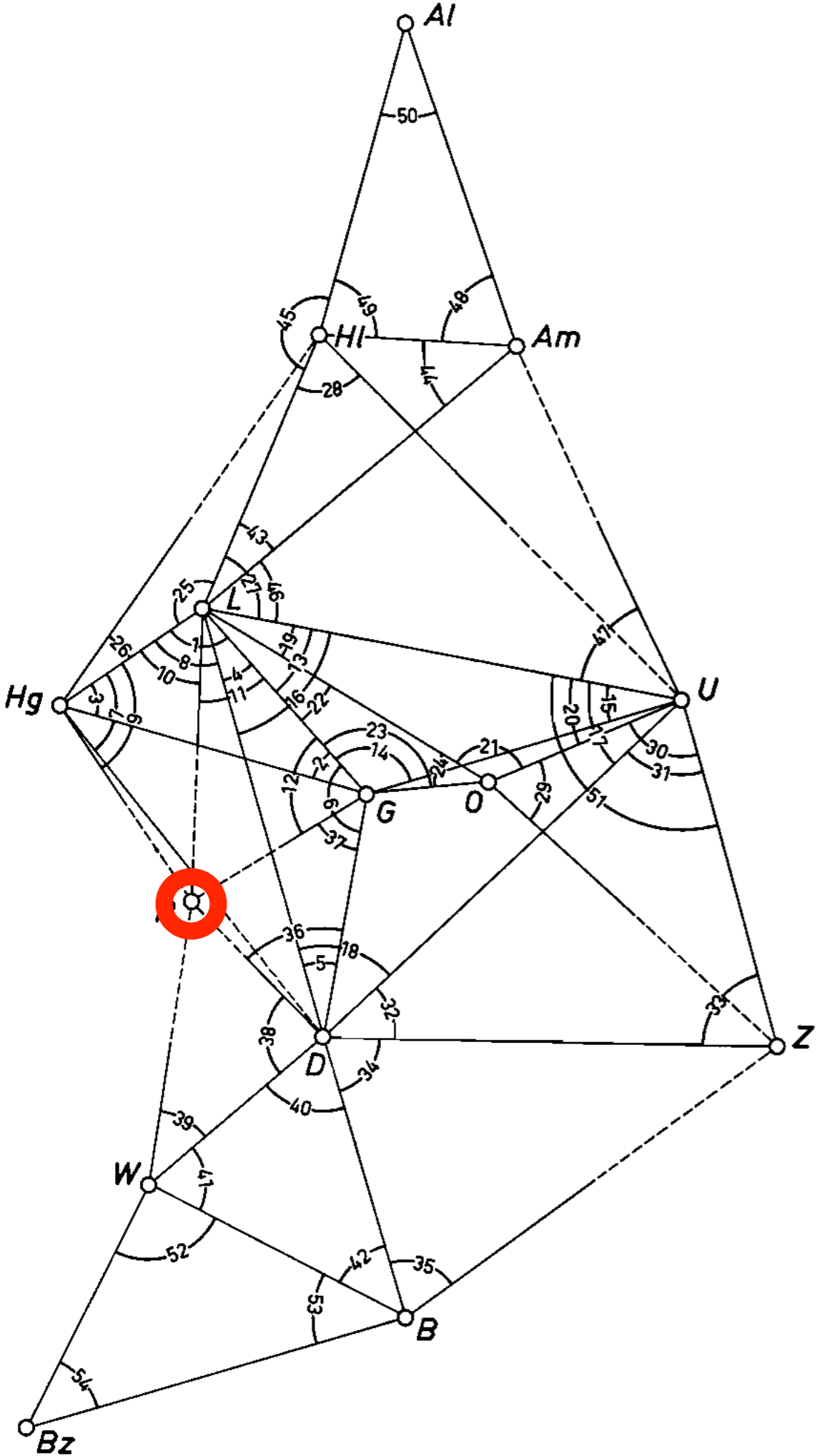
Dordrecht: Grote kerk



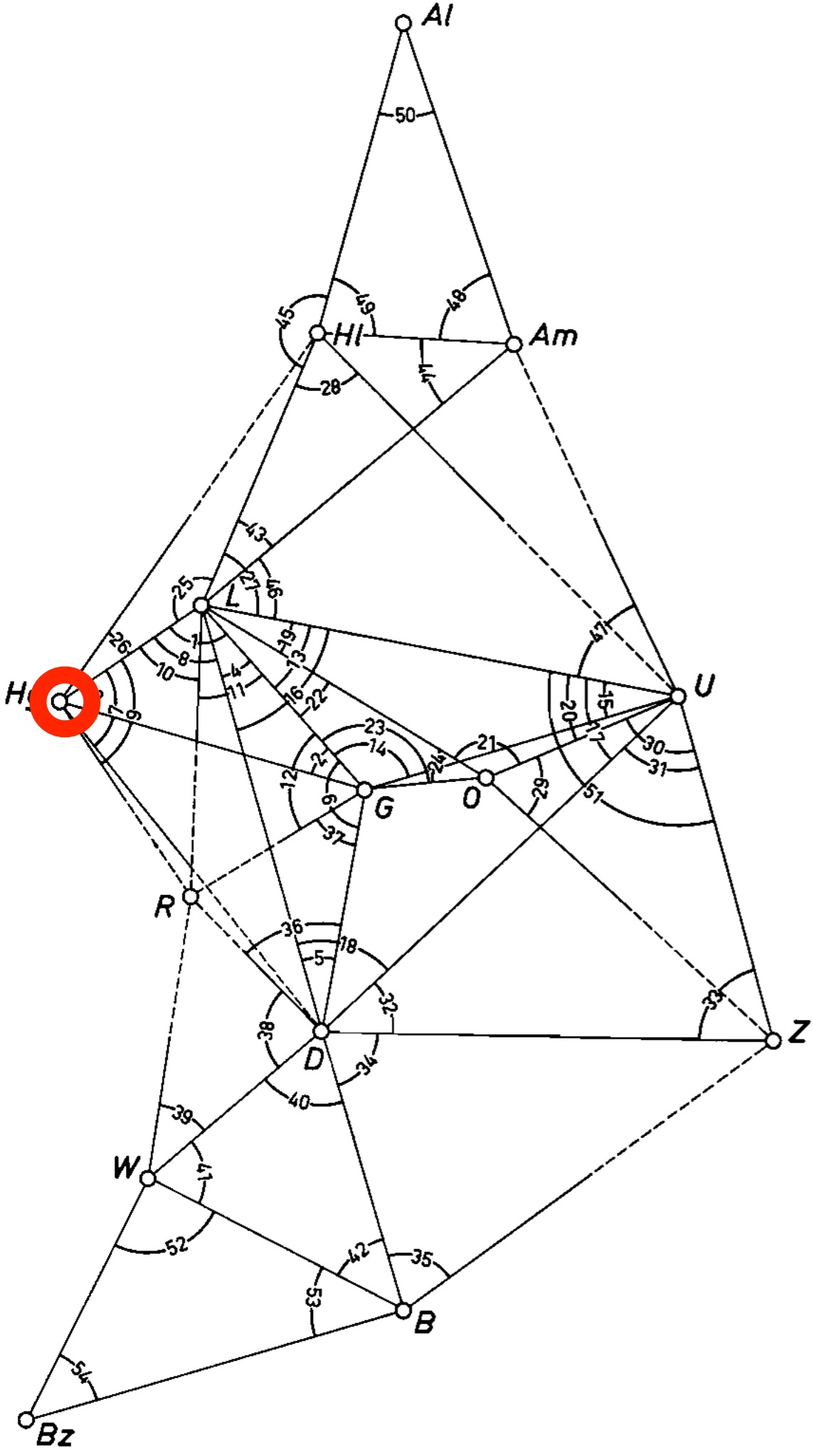
Zaltbommel: St. Martinuskerk



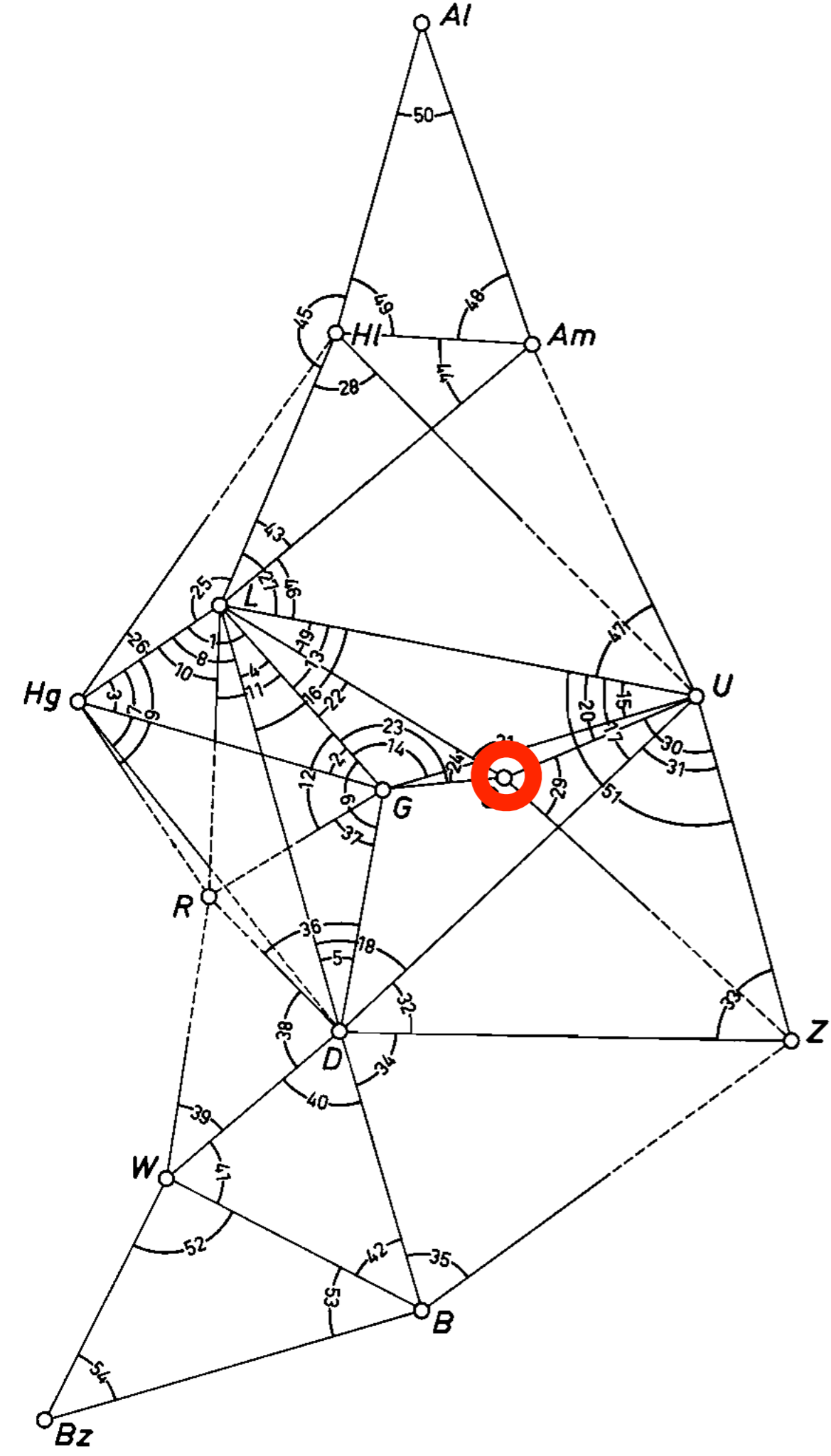
Rotterdam: St. Laurenskerk



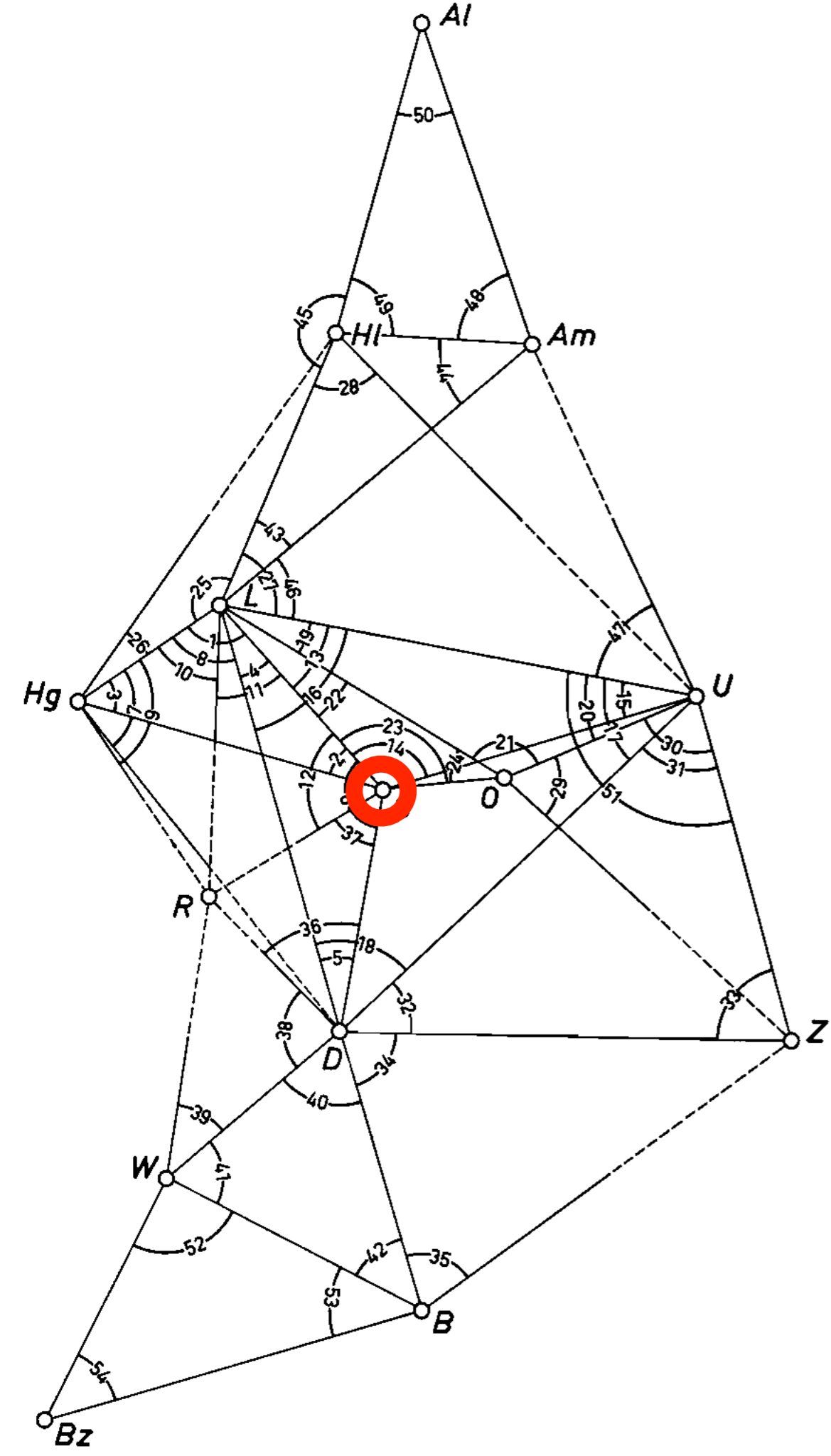
Den Haag: Jacobstoren



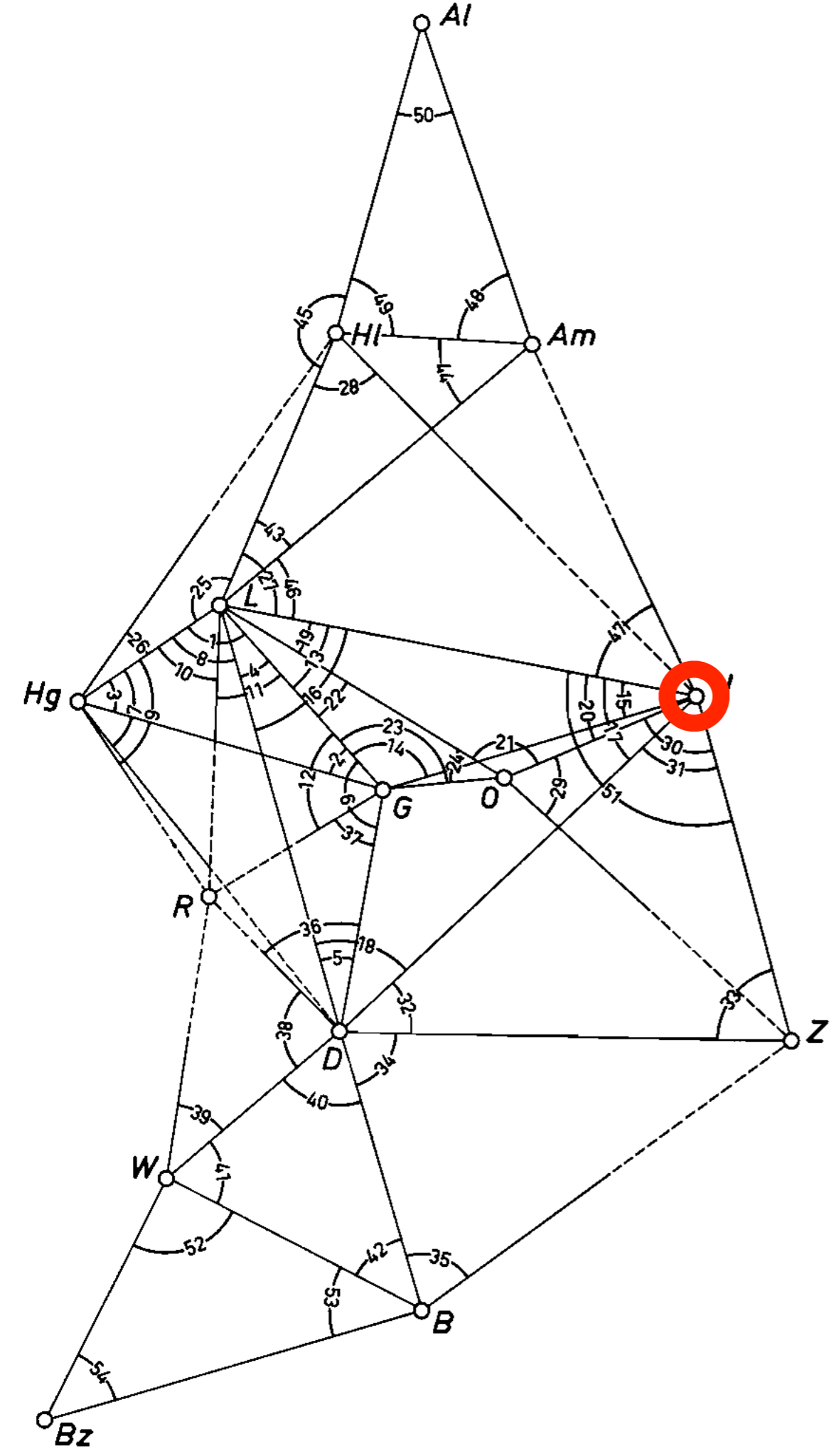
Oudewater: St. Michaelskerk



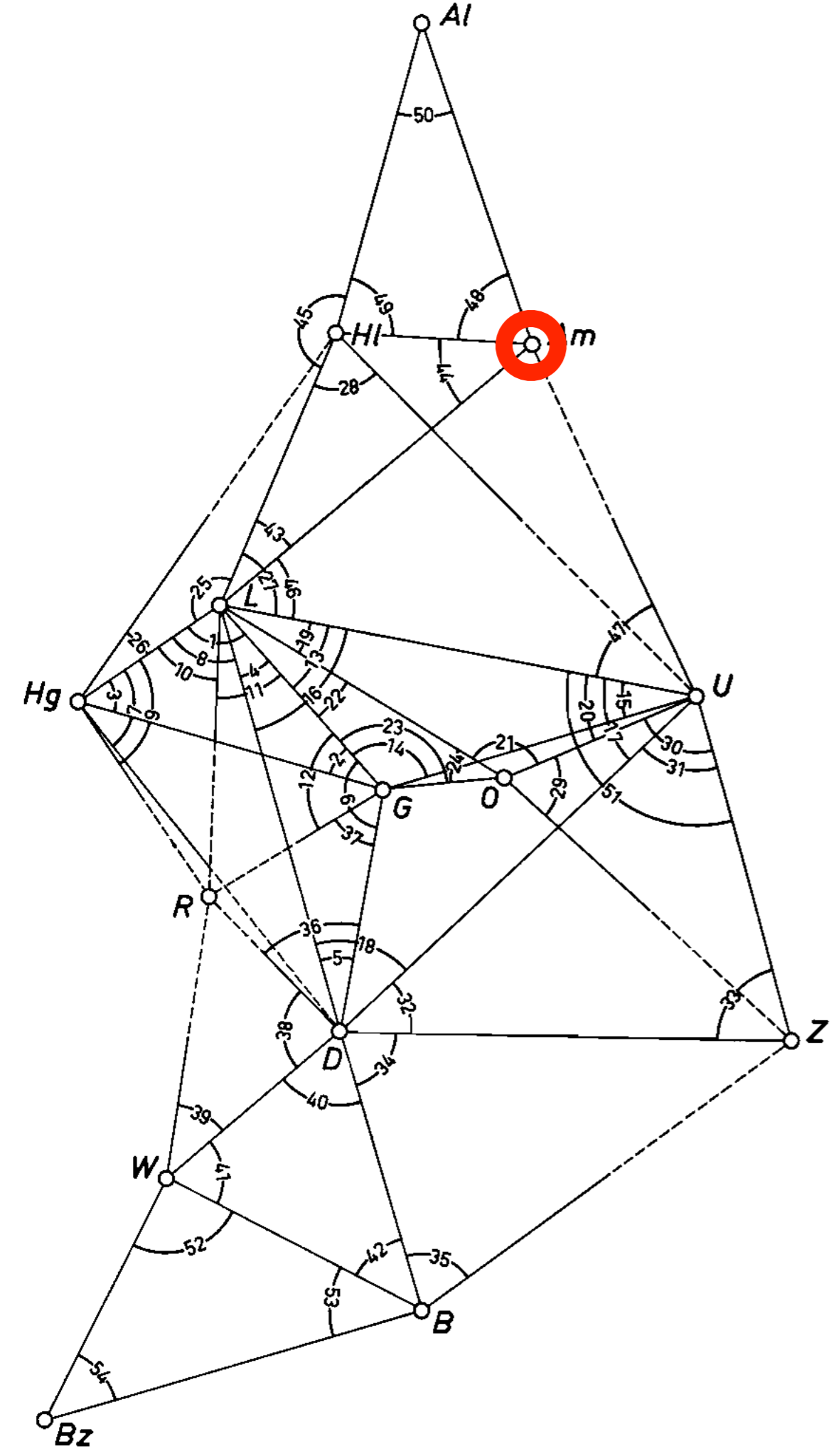
Gouda: St. Janskerk



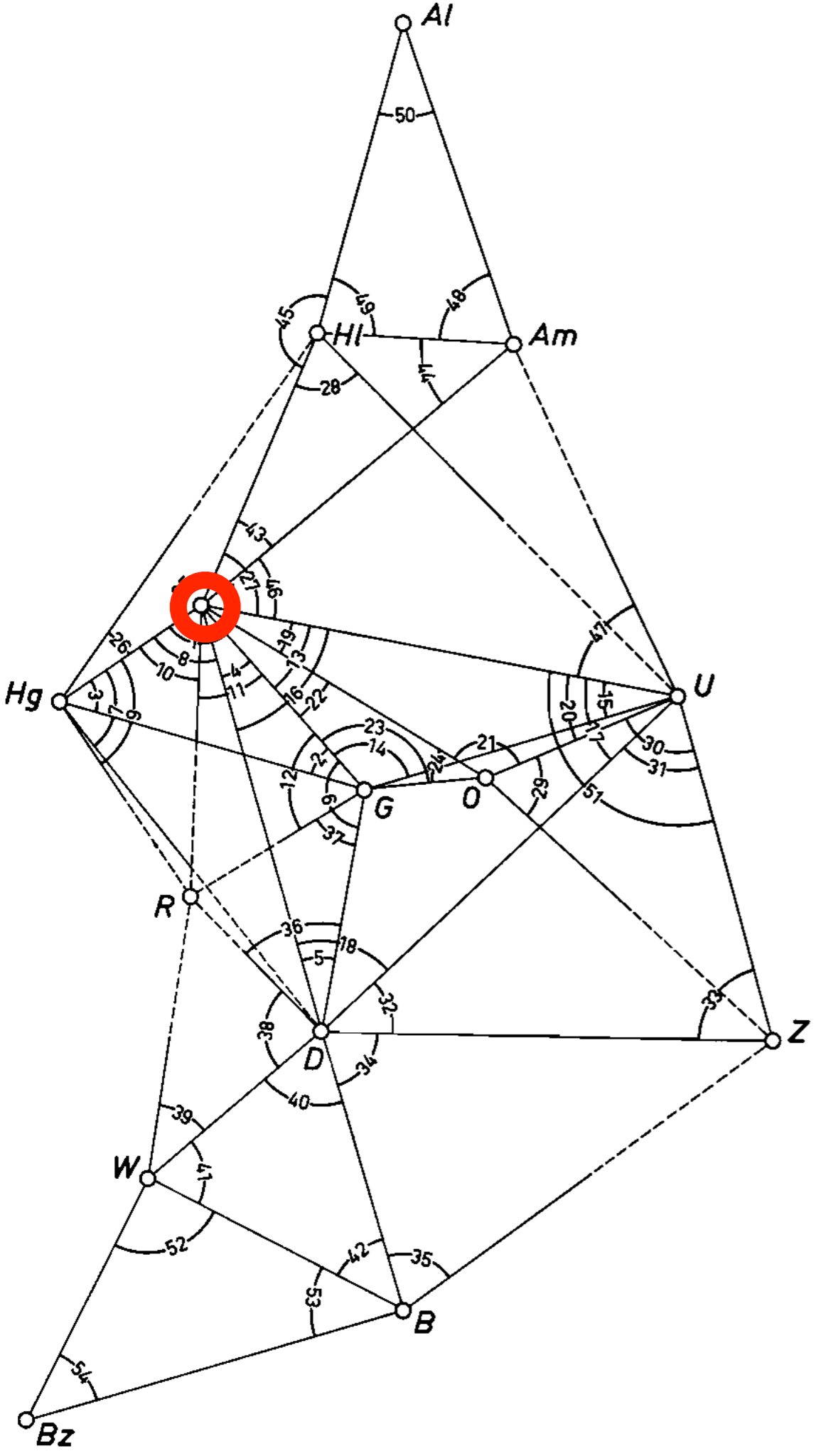
Utrecht: Domtoren



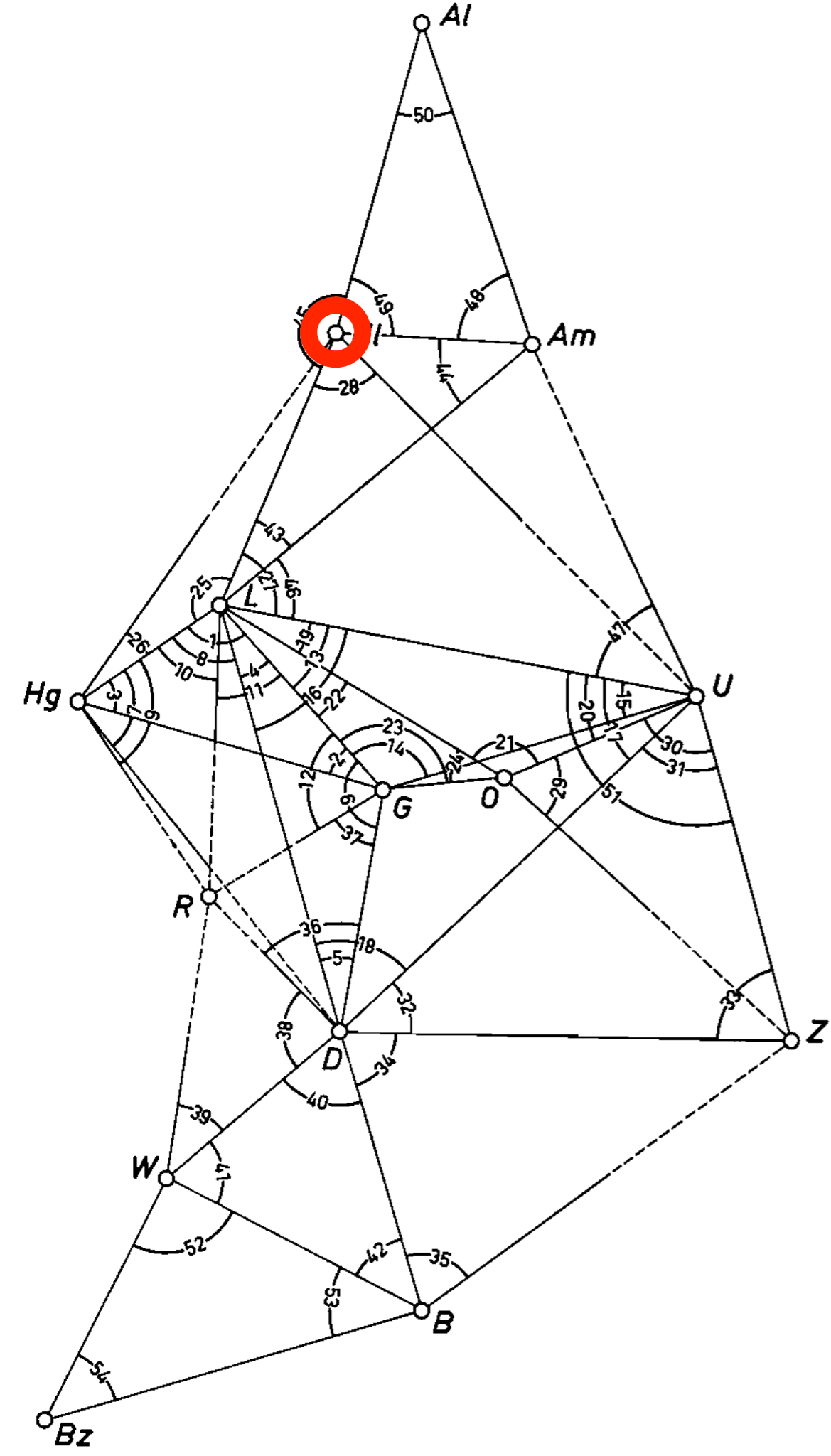
Amsterdam: St. Nicolaaskerk



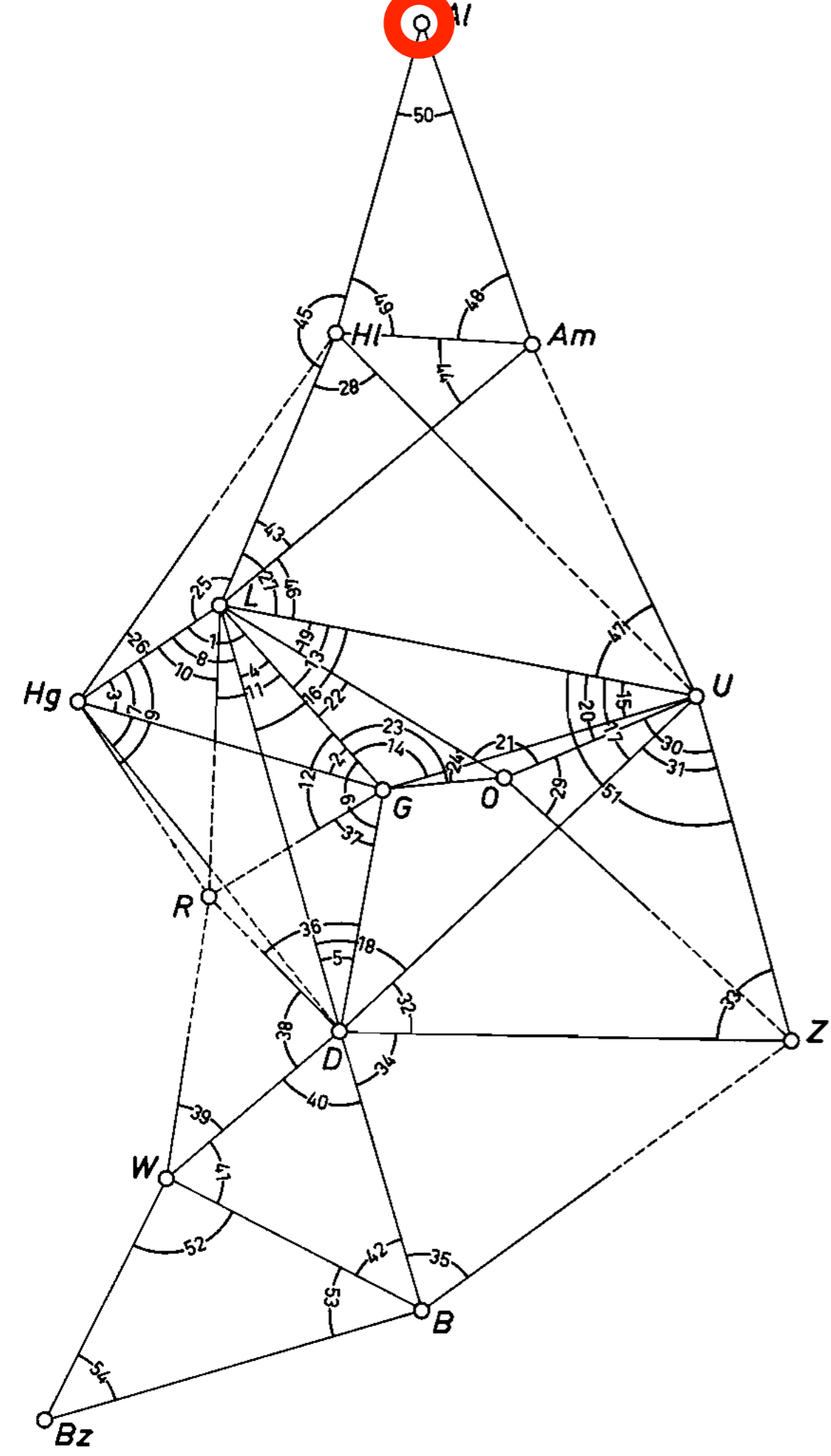
Leiden: Town Hall



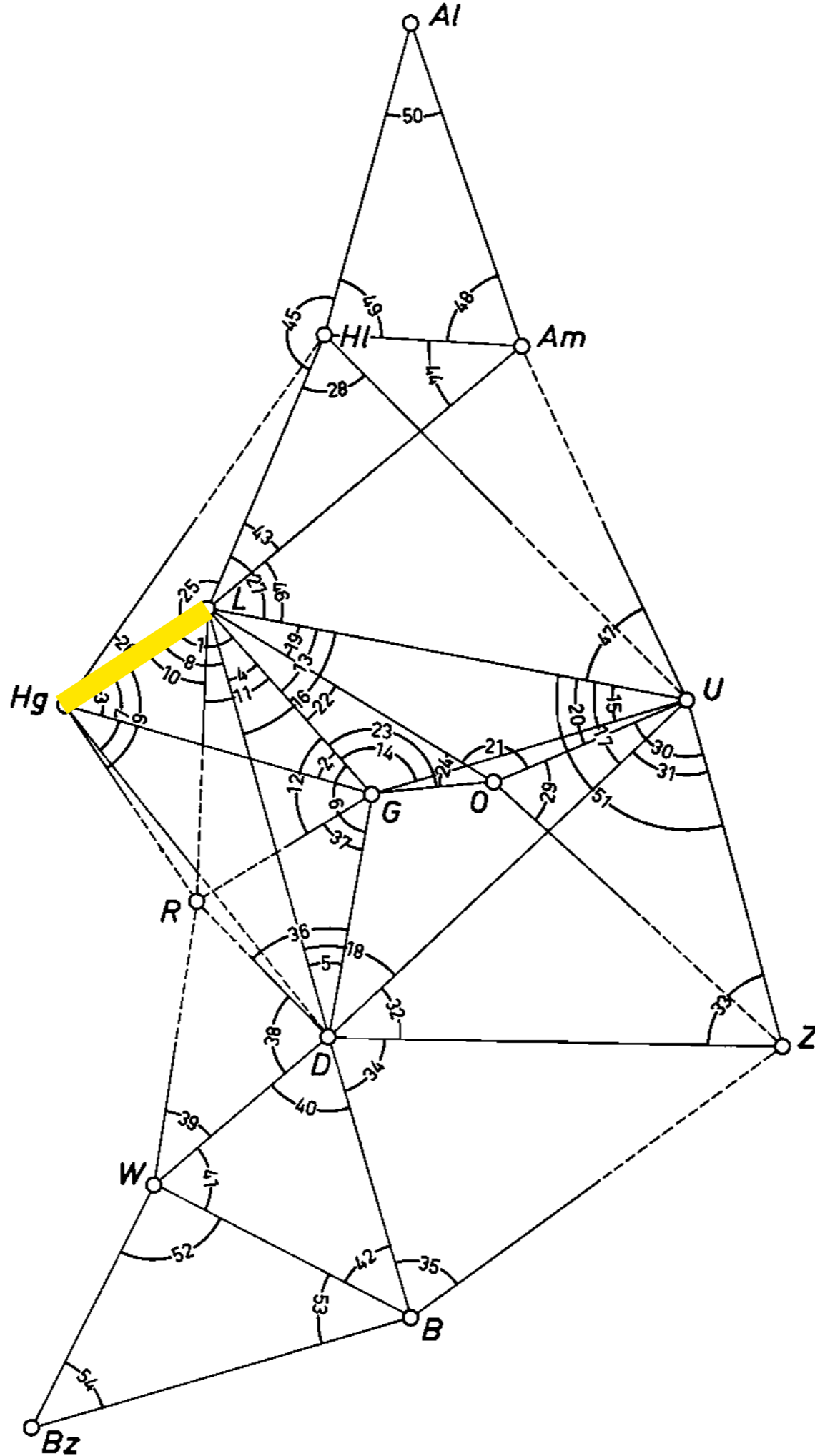
Haarlem: St. Bavokerk



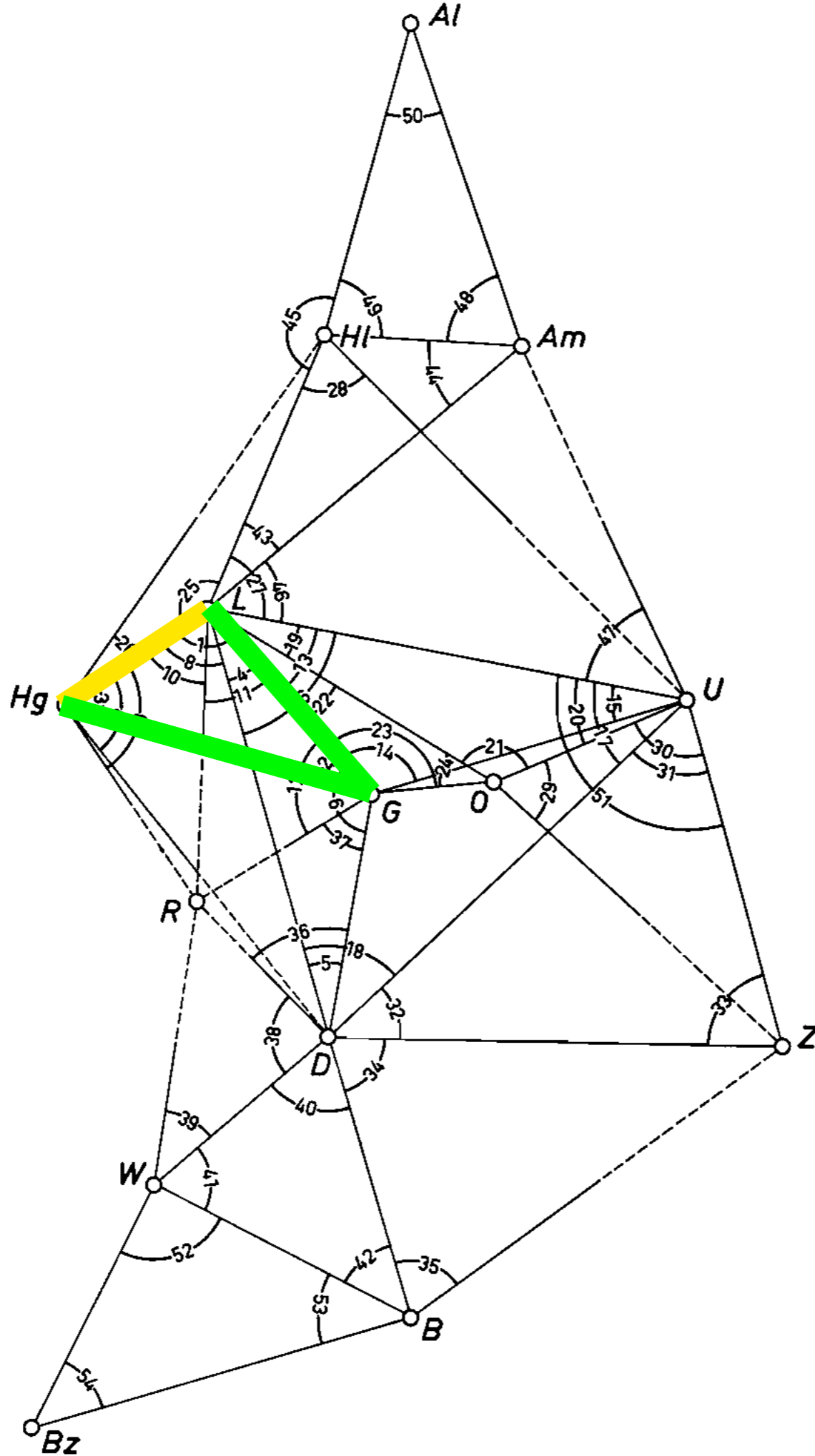
Alkmaar: St. Laurenskerk



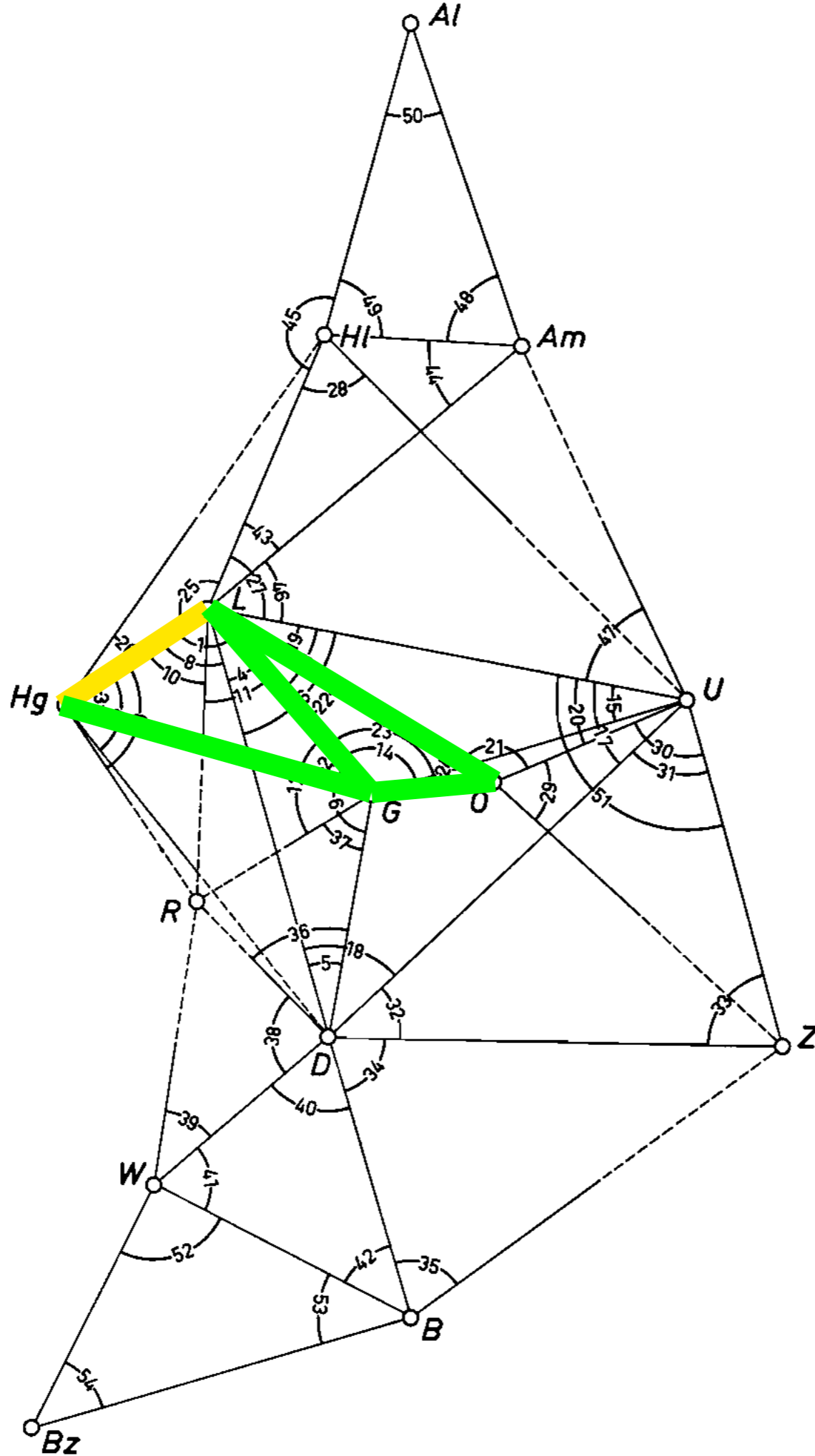
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10	53 40	37	48 15
11	43 36	38	86 19
12	80 00	39	41 10
13	37 40	40	66 11
14	114 48	41	67 51
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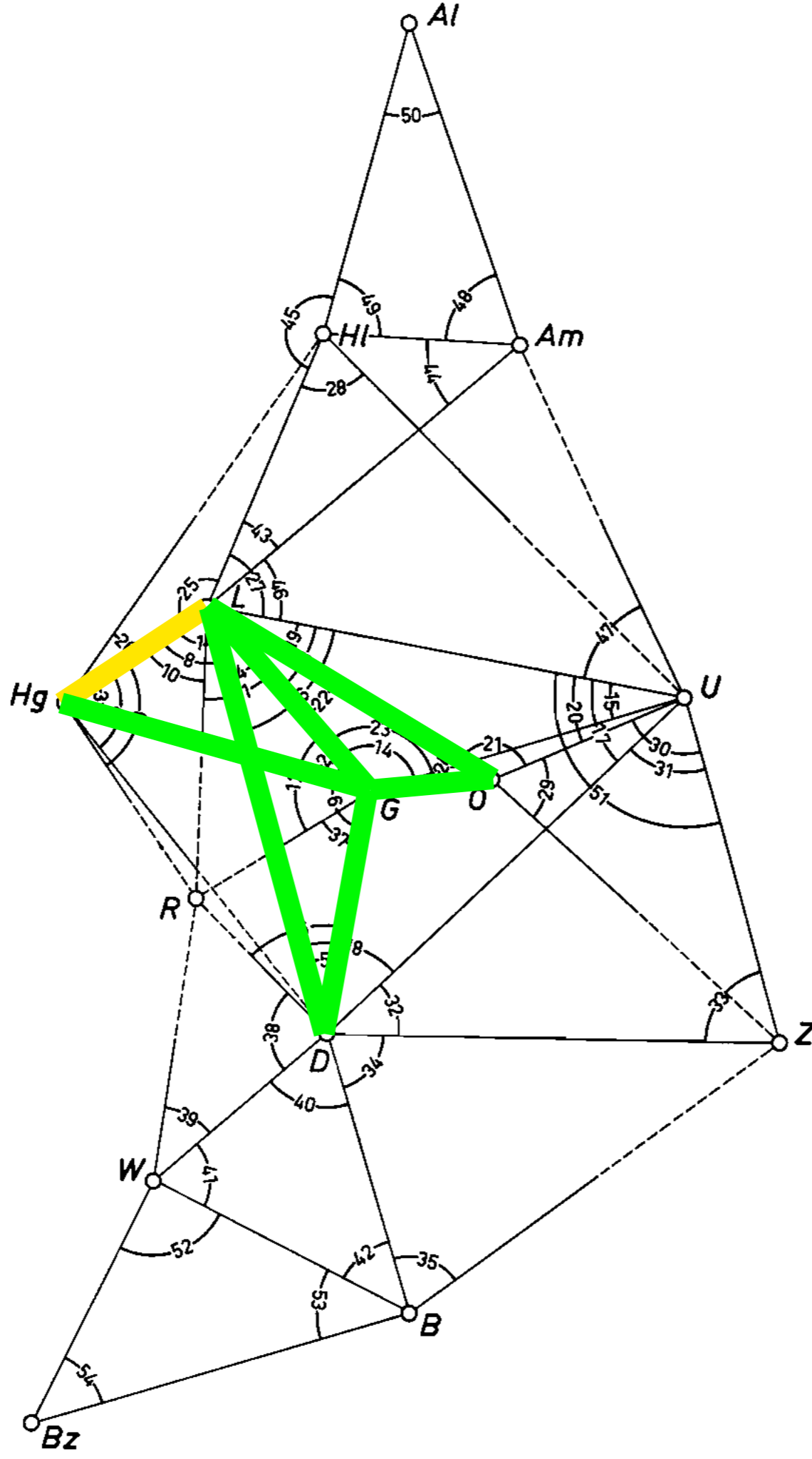
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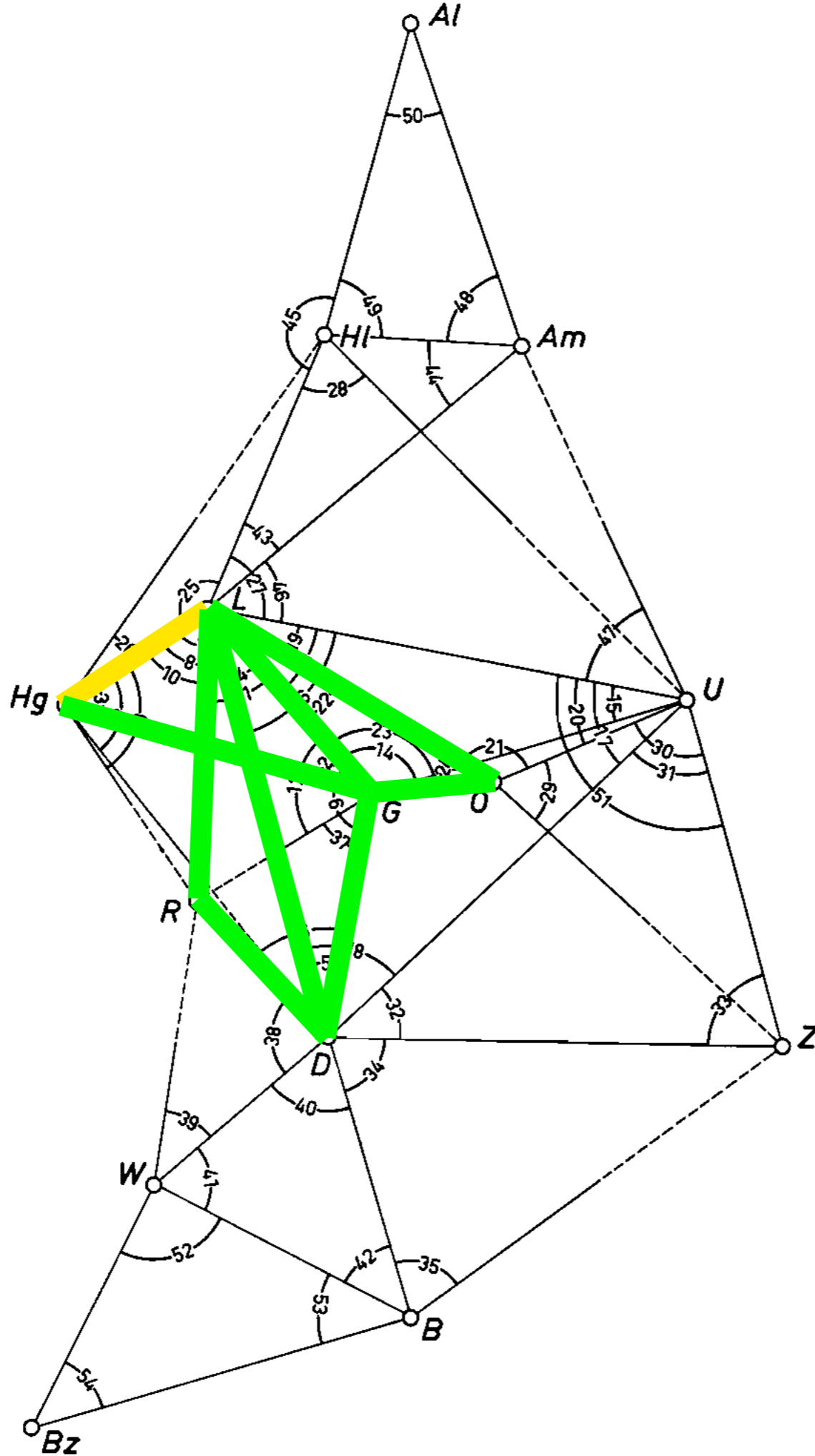
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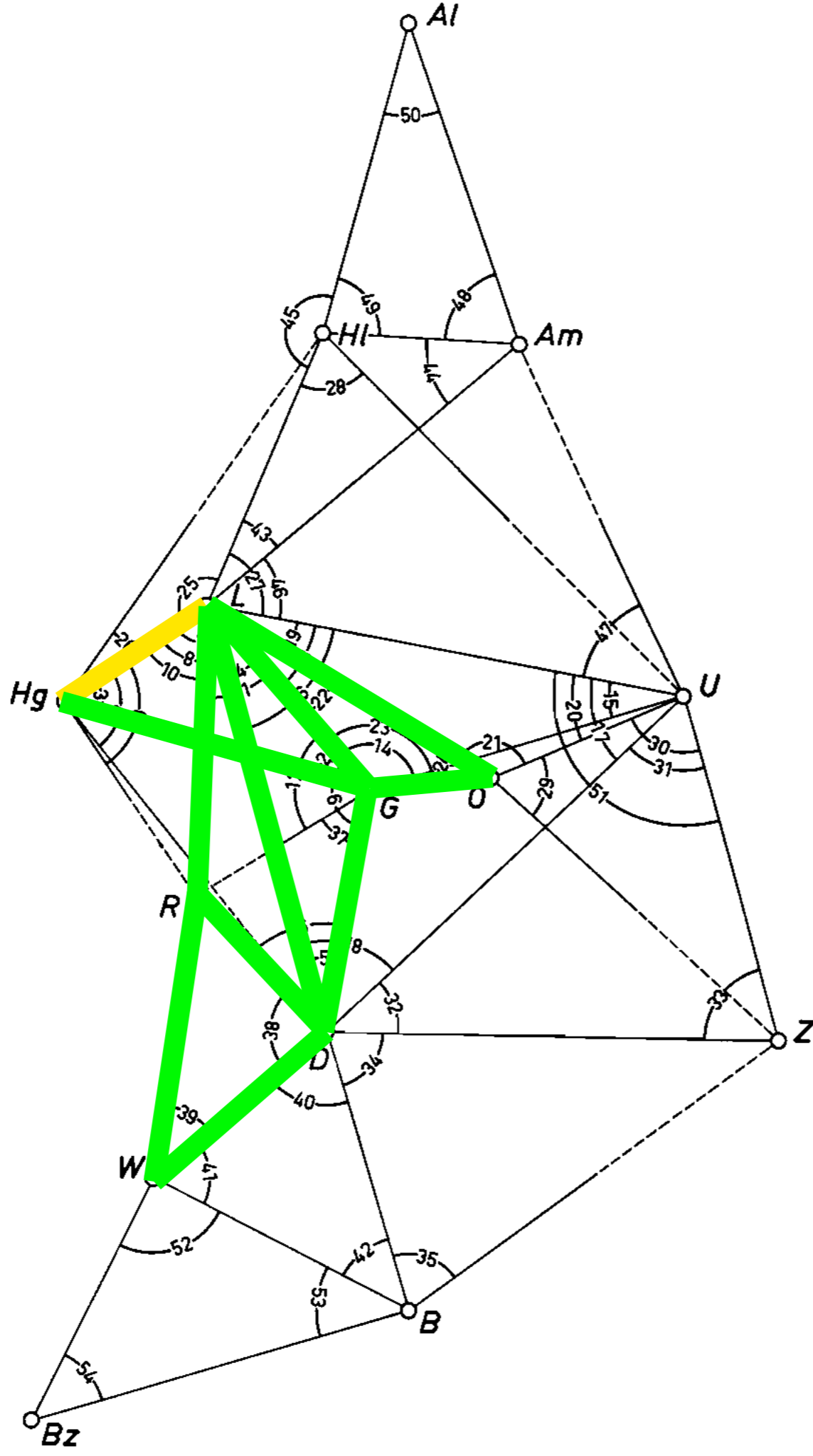
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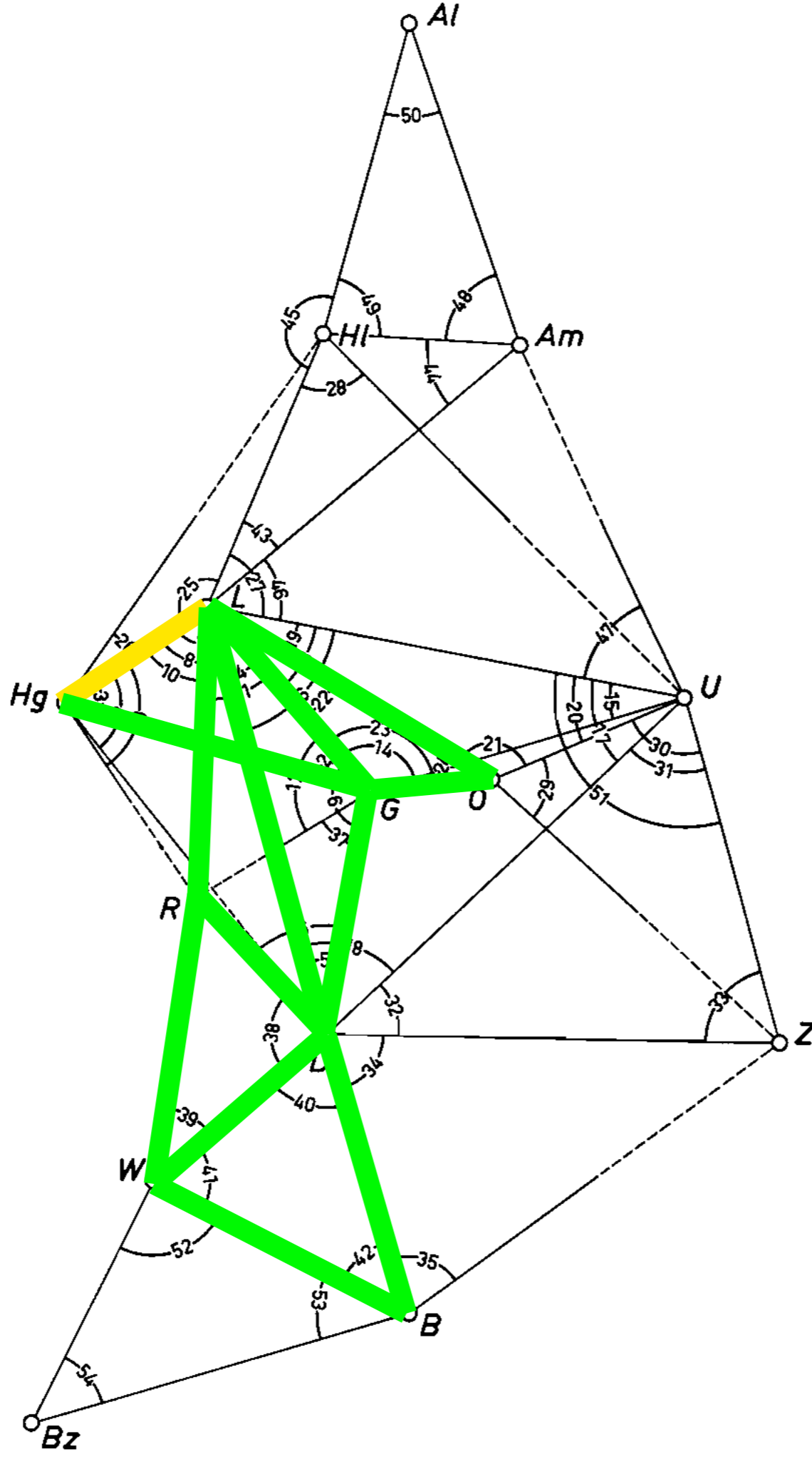
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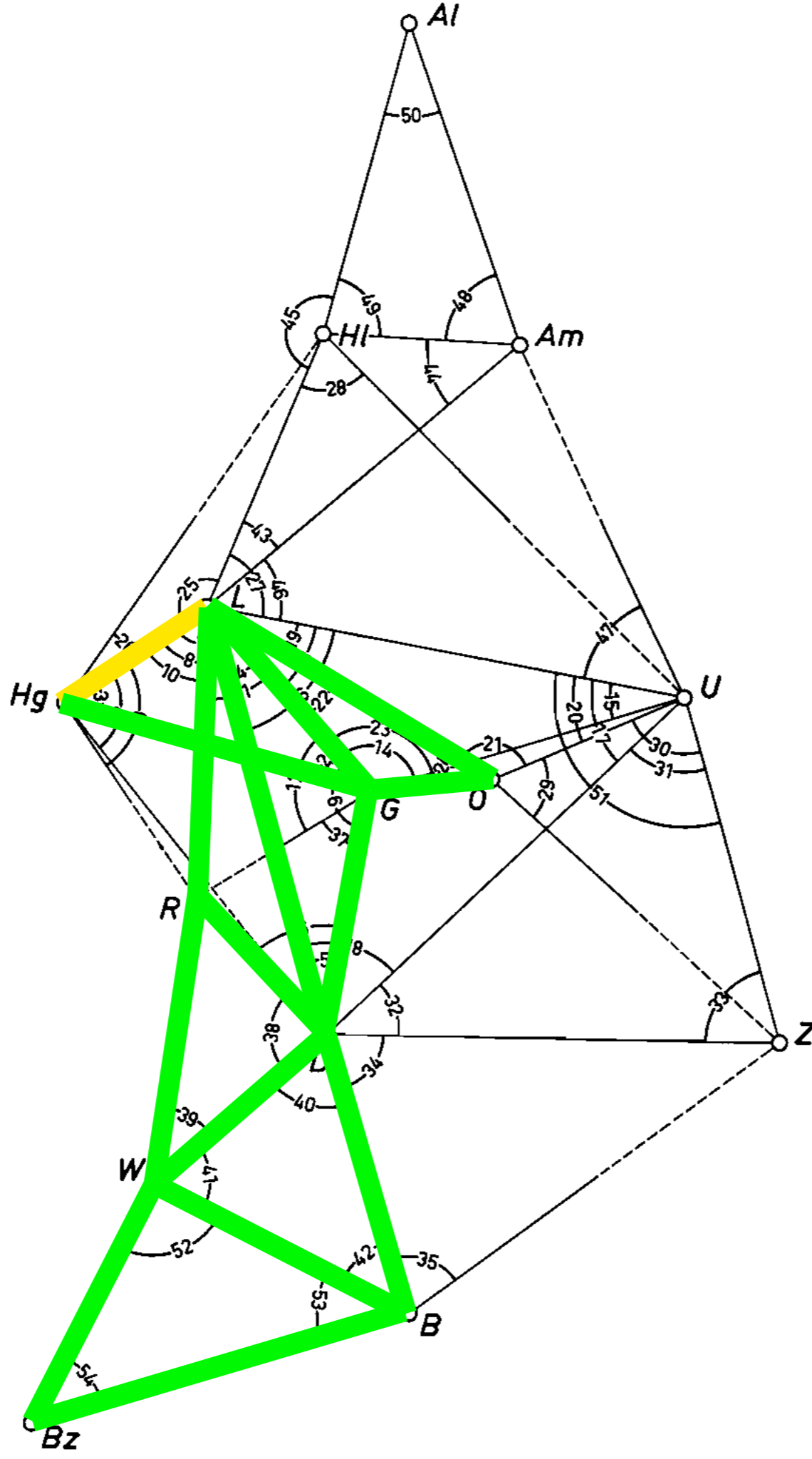
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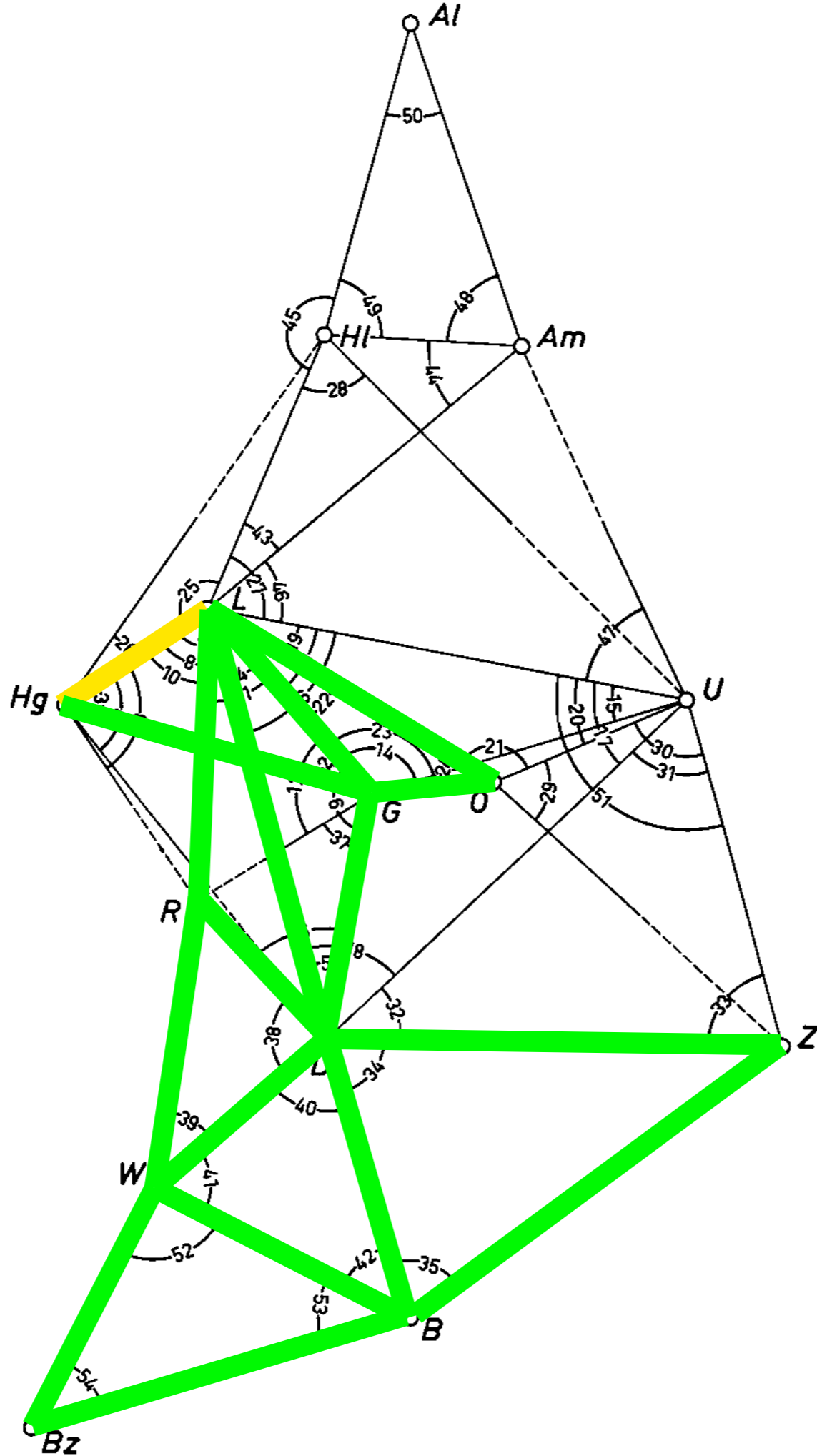
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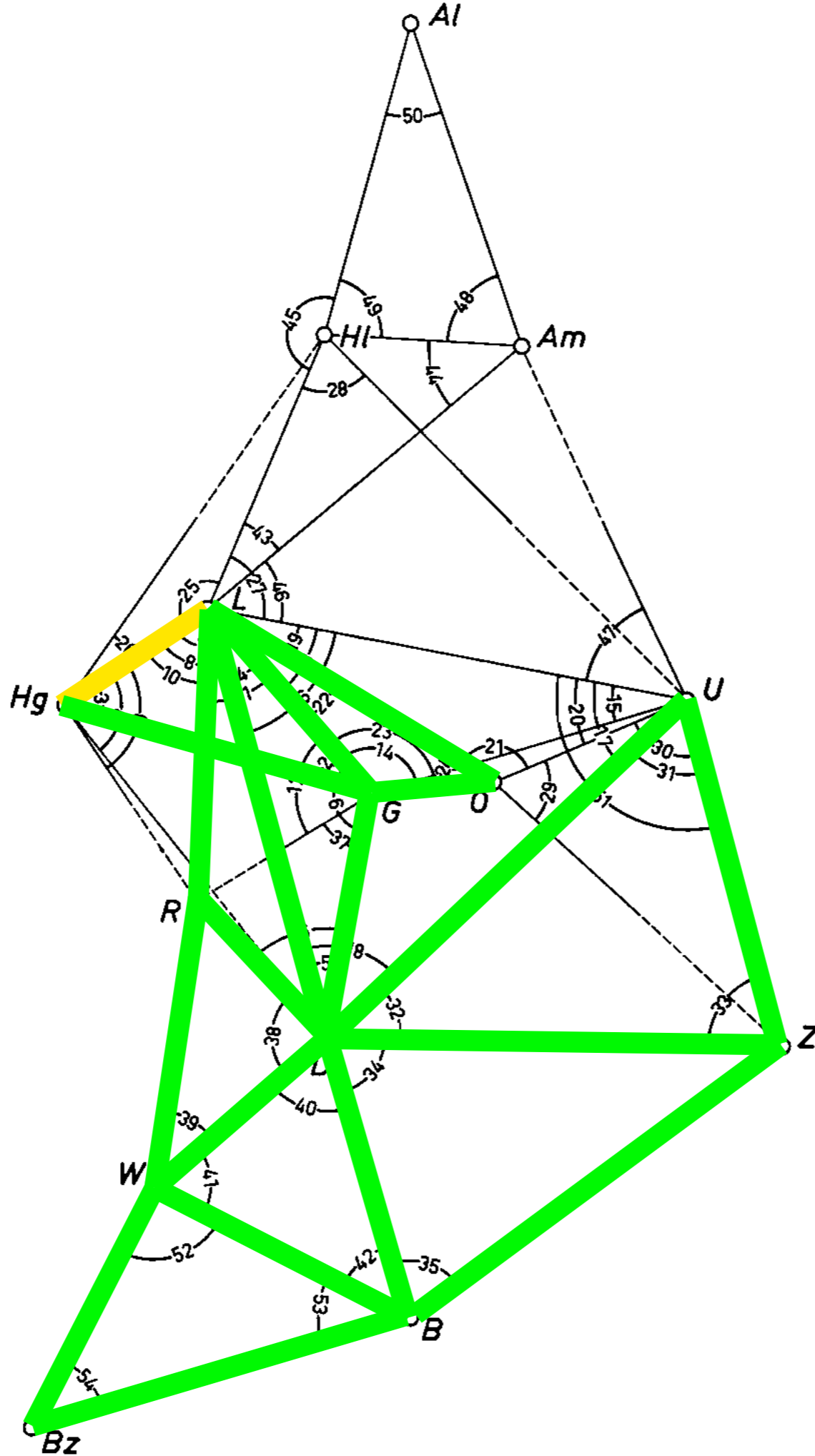
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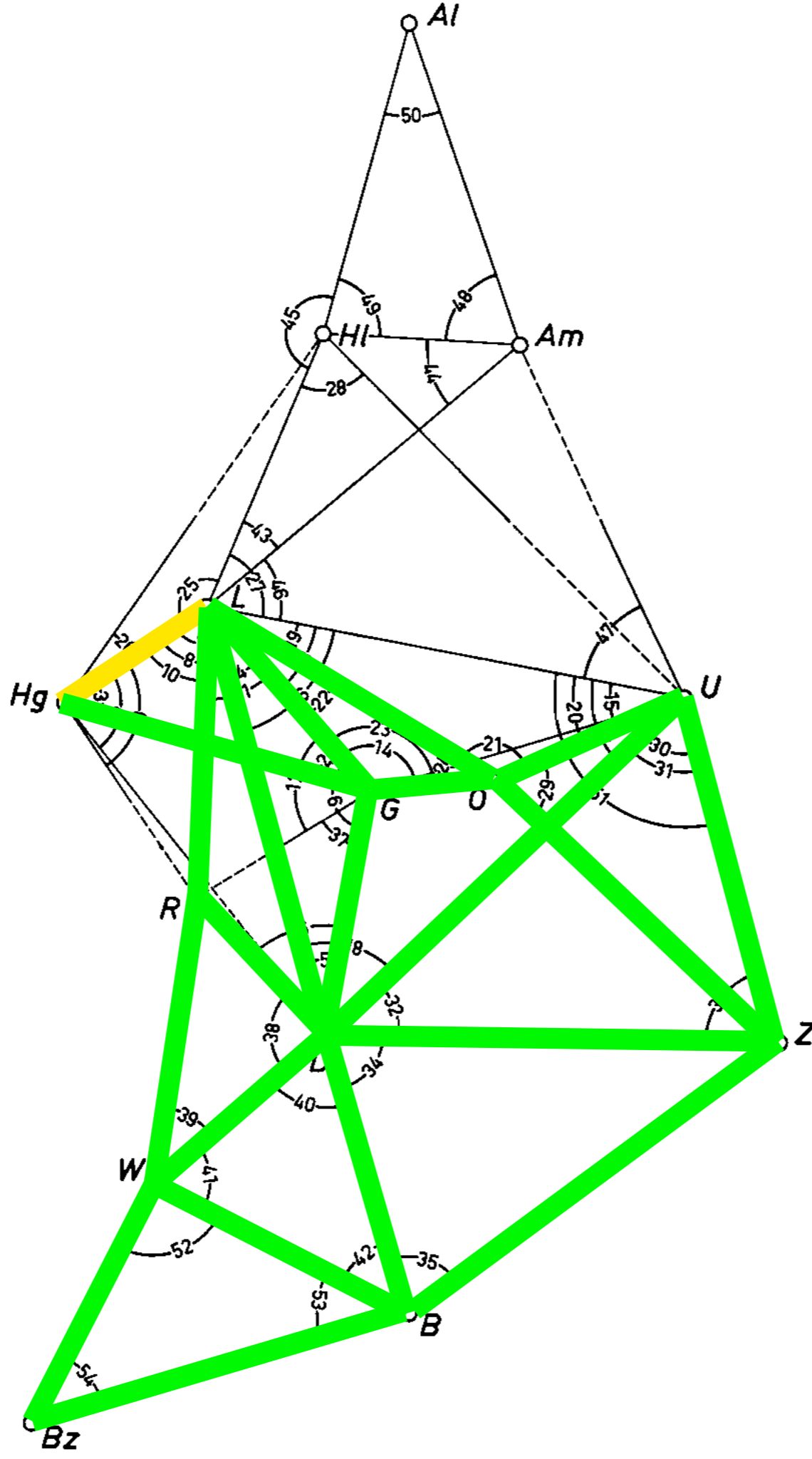
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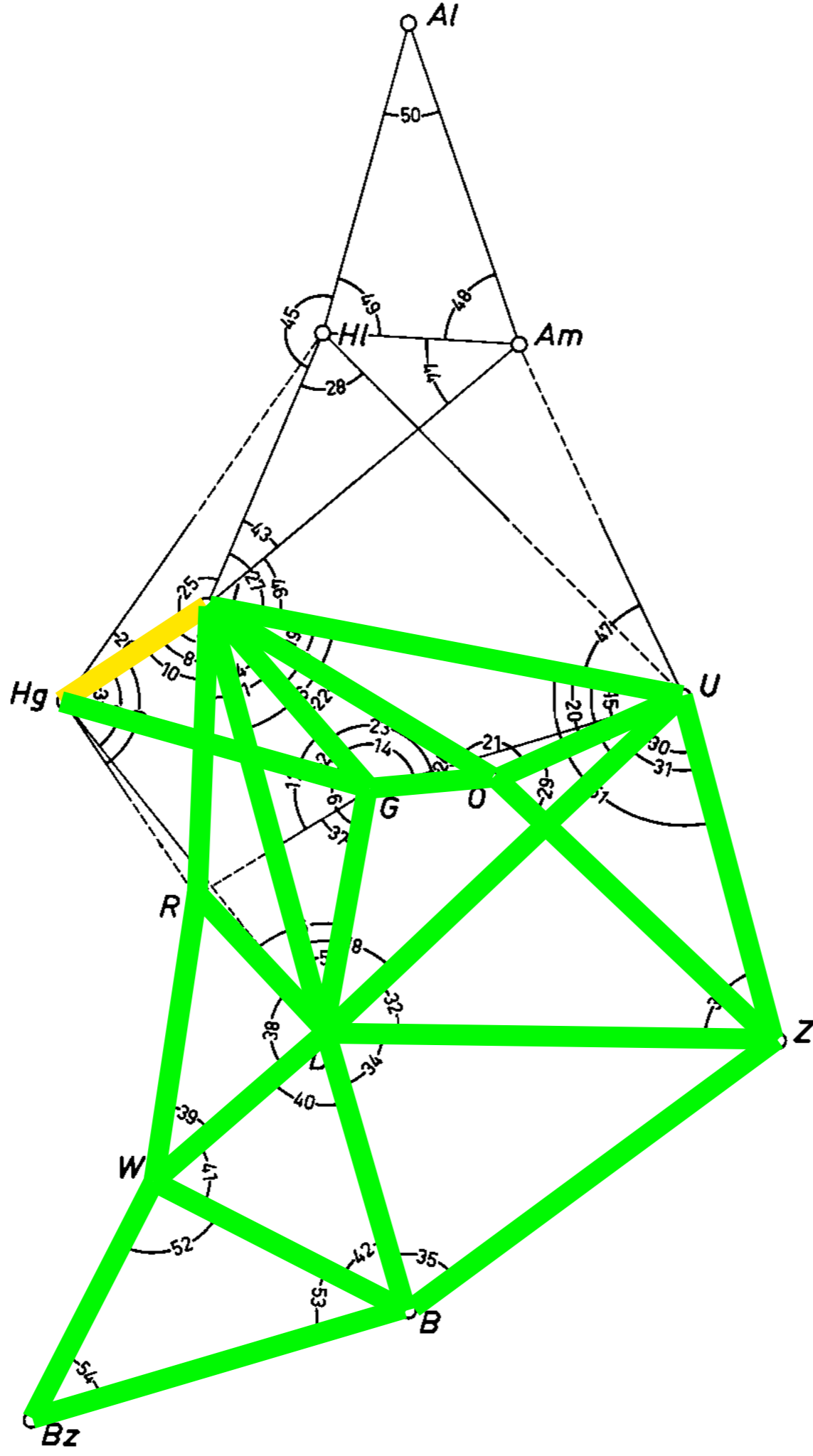
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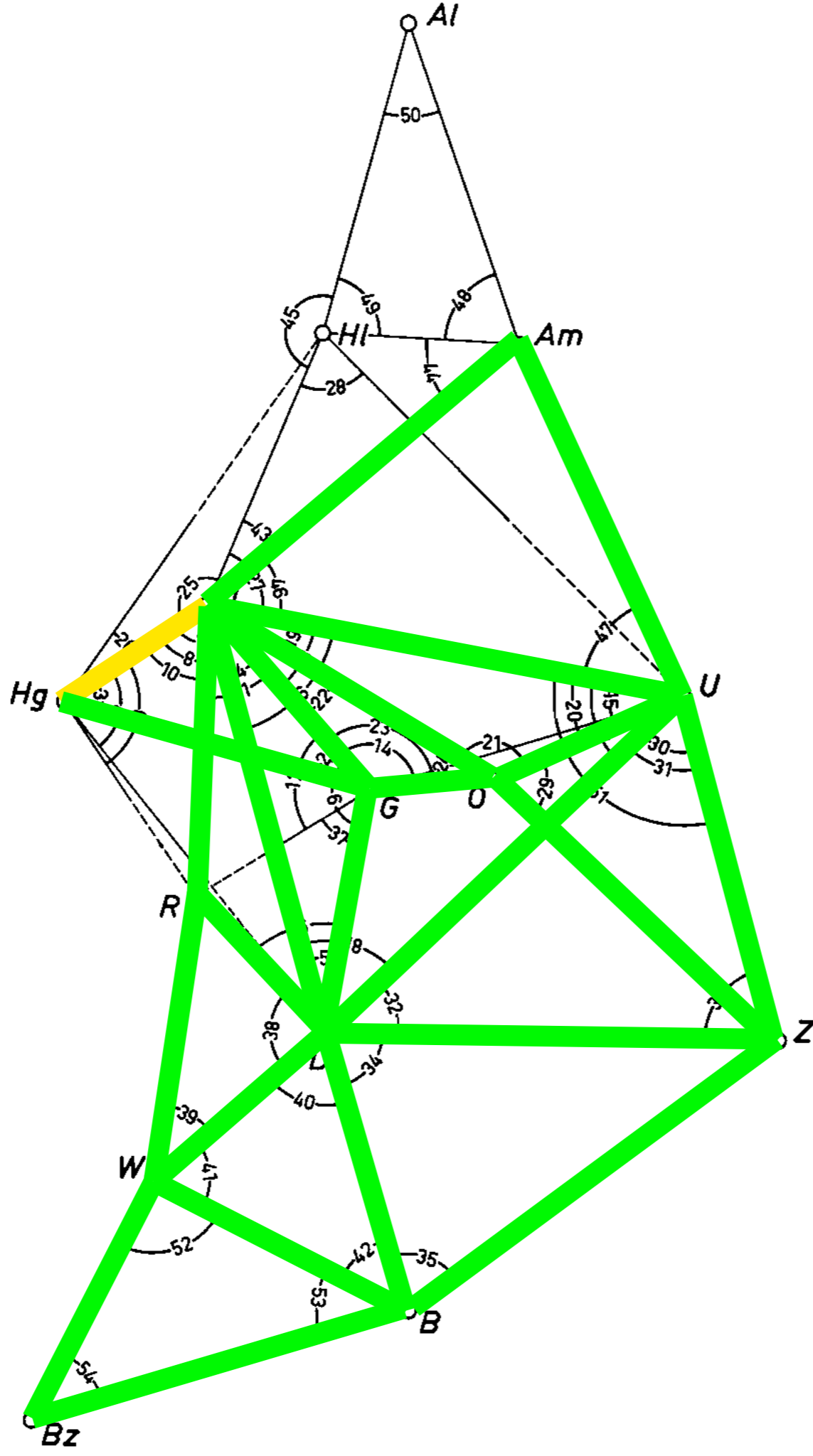
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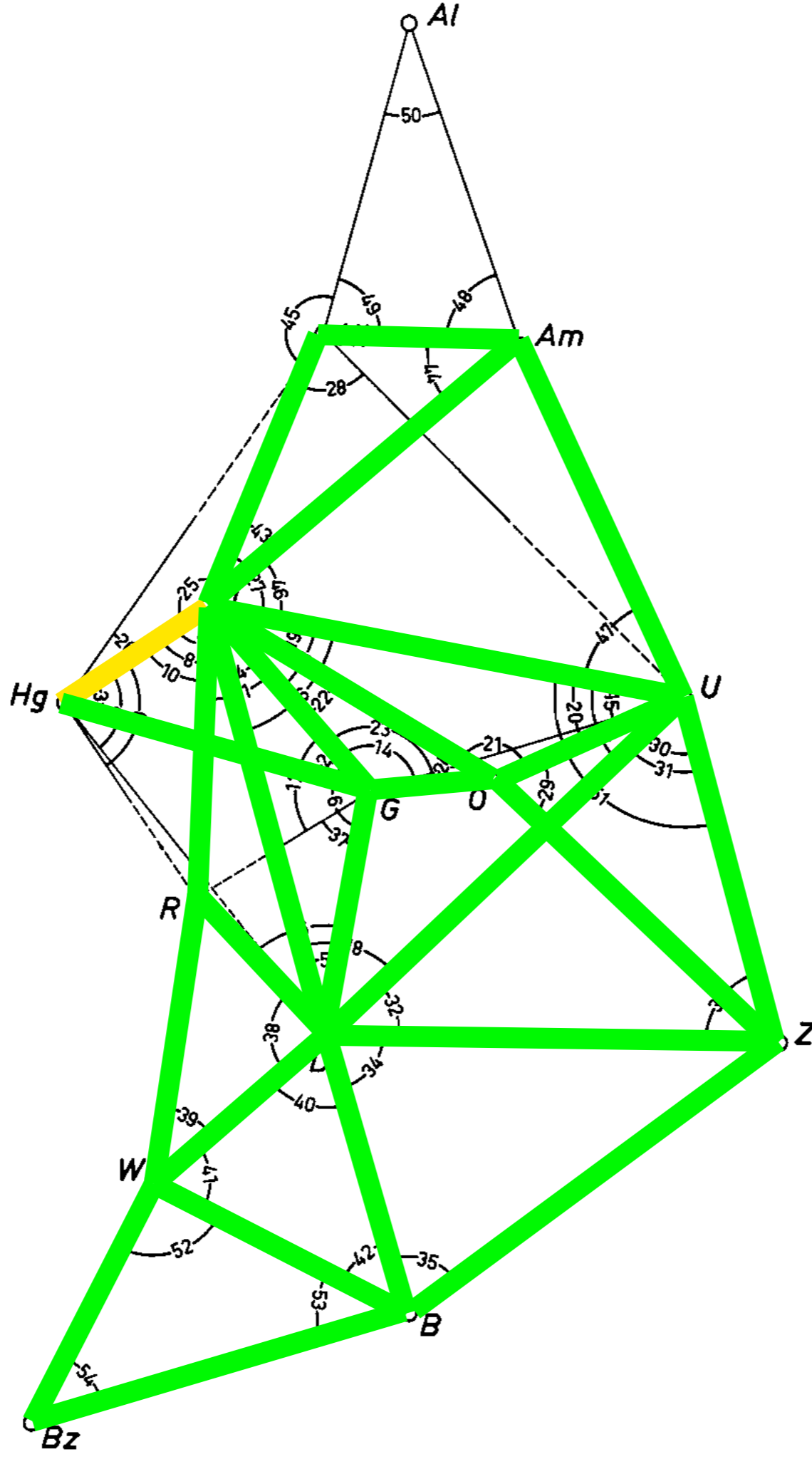
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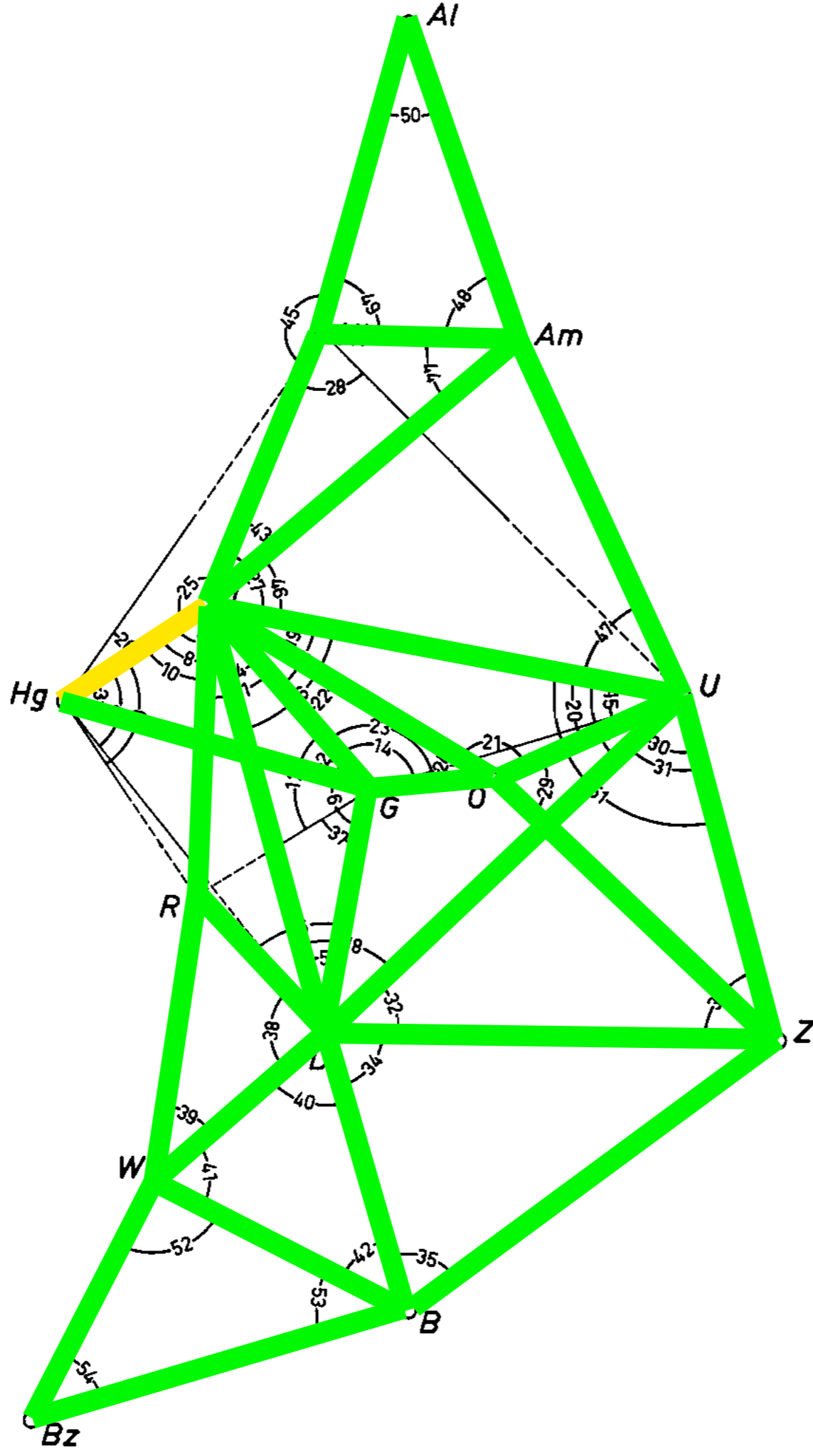
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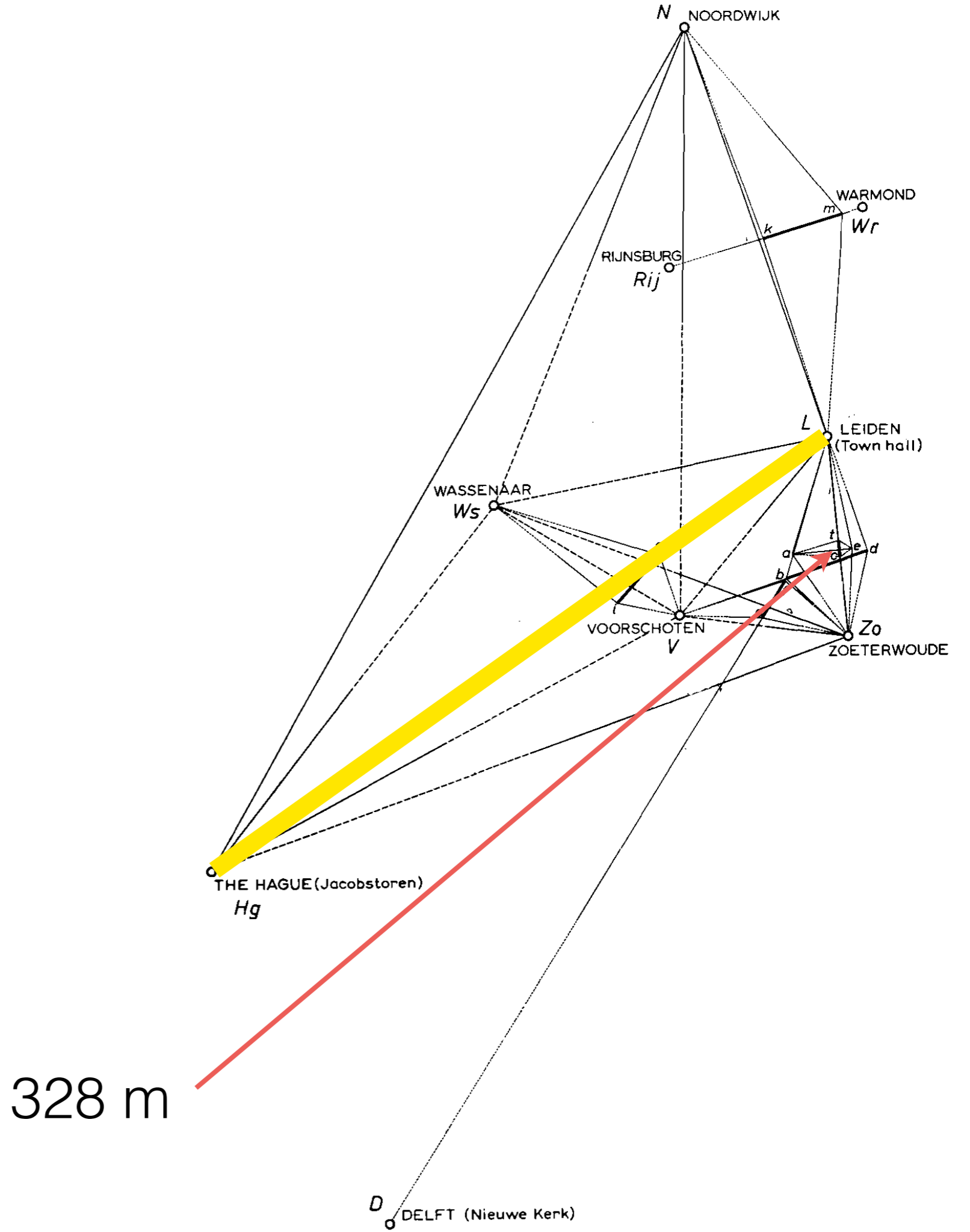
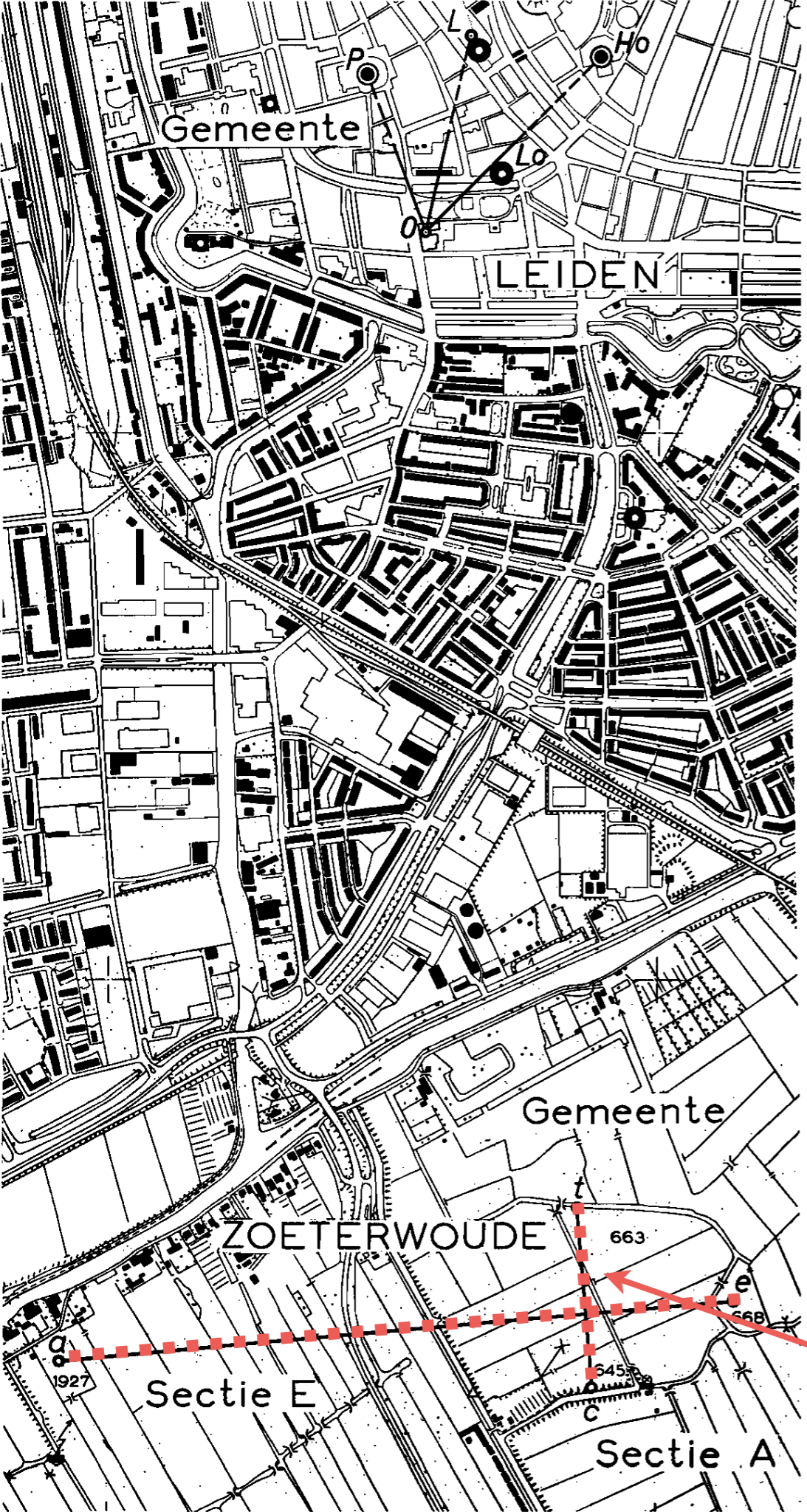
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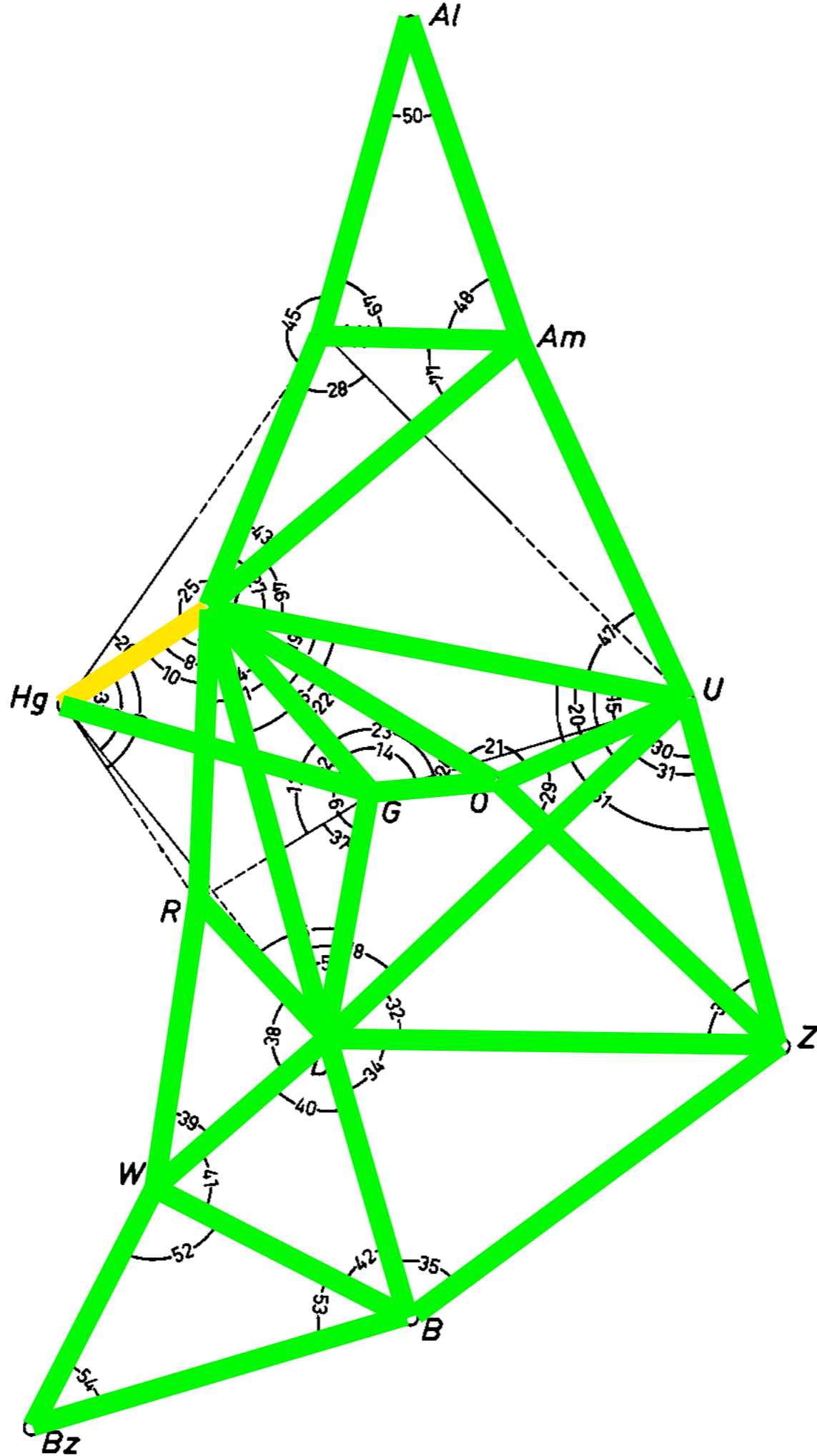
XXX. PROBLEMA.

Triangulum EIY. Leida, Herlemum Alcmaria

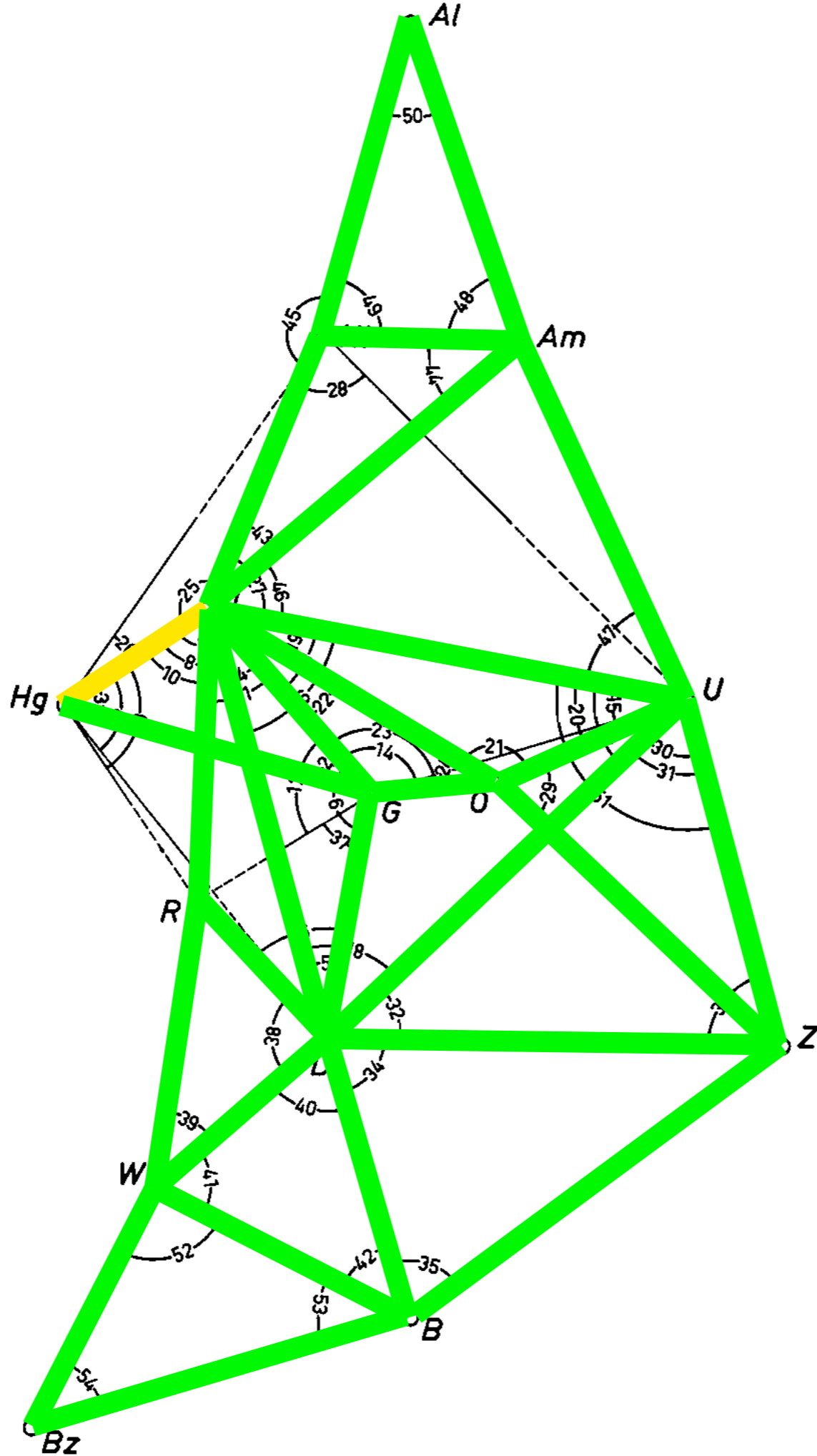
Per problema 14 datur <i>EI</i> , distantia inter Leidam & Herlemum	7030.1
Per problema is datur <i>IY</i> , distantia inter Harlemum & Alcmariam	7754.2
Ex observatione ipsa angulus <i>EIY</i>	172 gr. 11 scr.
Quamobrem <i>EY</i> distantia Alcmariæ & Leidæ dabitur	14749.7.
Et angulus <i>IEY</i>	4 gr, 6 scr.
Et angulus <i>EYI</i>	3 gr. 43 scr.



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Δ latitude:
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