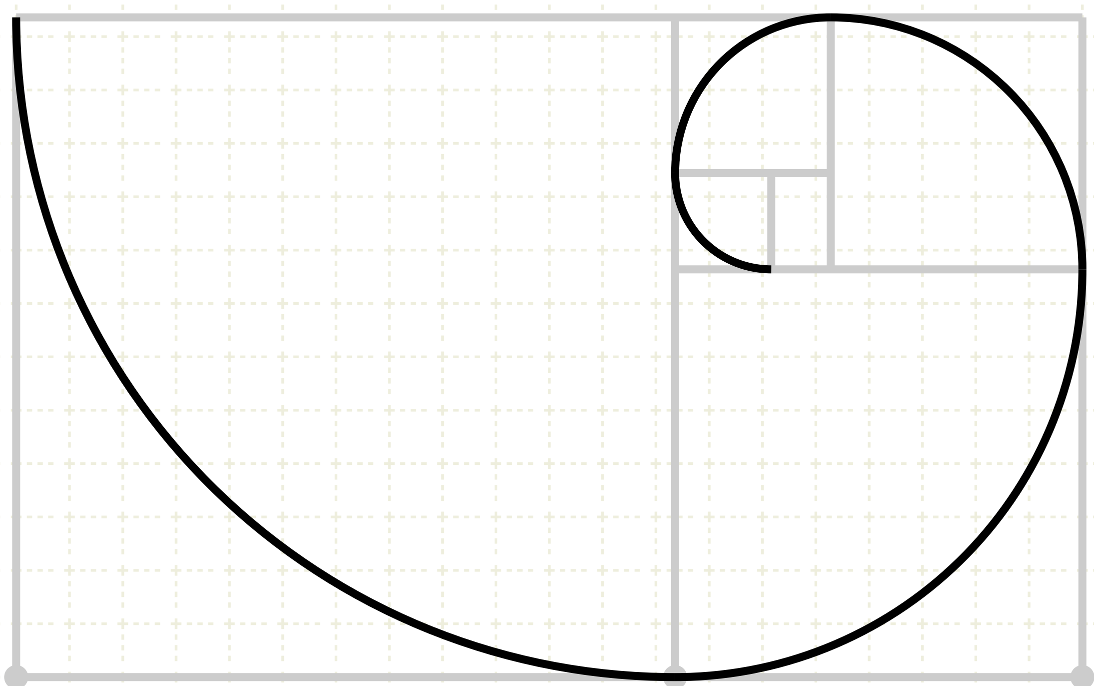
Euclid's Elements

Book VI



One can state, without exaggeration, that the observation of and the search for similarities and differences are the basis of all human knowledge.

Alfred Nobel

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Proposition 26 of Book VI

If from a parallelogram there be taken away a parallelogram similar and similarly situated to the whole and having a common angle with it, it is about the same diameter with the whole

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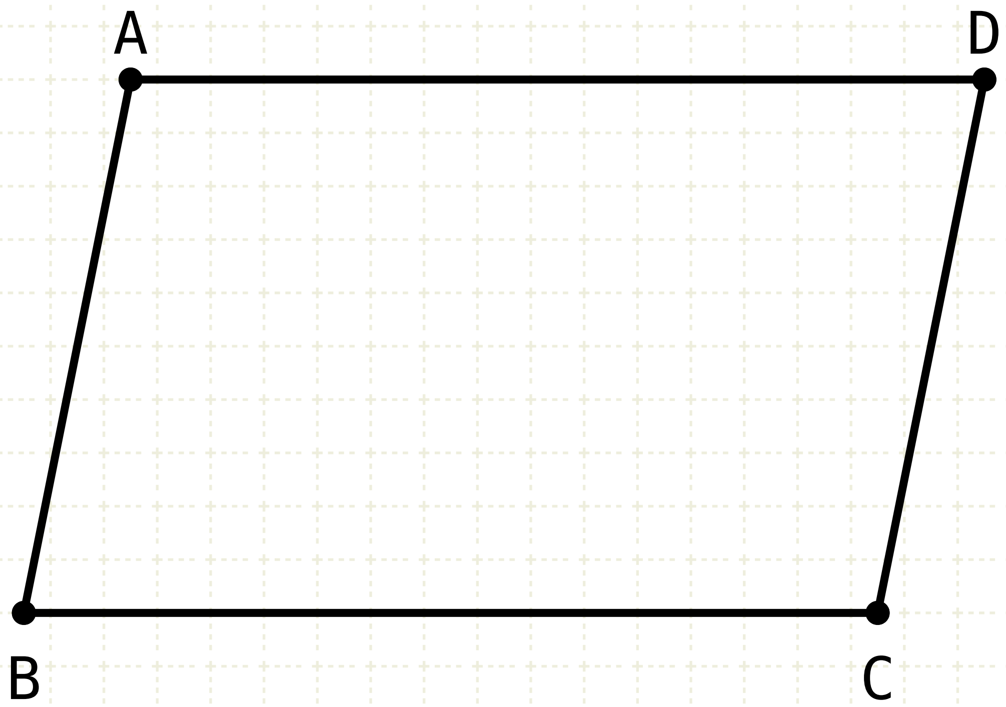
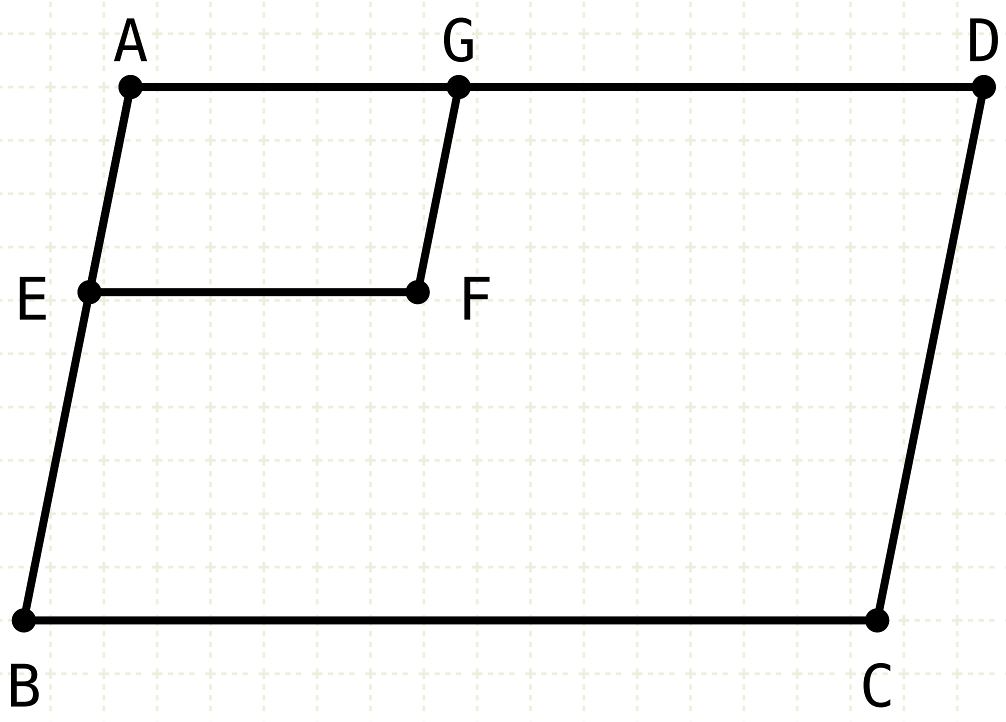


In other words

Given a parallelogram ABCD

Proposition 26 of Book VI

If from a parallelogram there be taken away a parallelogram similar and similarly situated to the whole and having a common angle with it, it is about the same diameter with the whole



AGFE ~ ABCD

In other words

Given a parallelogram ABCD

And a smaller similar parallelogram AGFE, sharing a common angle DAB, and the lines AG and AD being collinear

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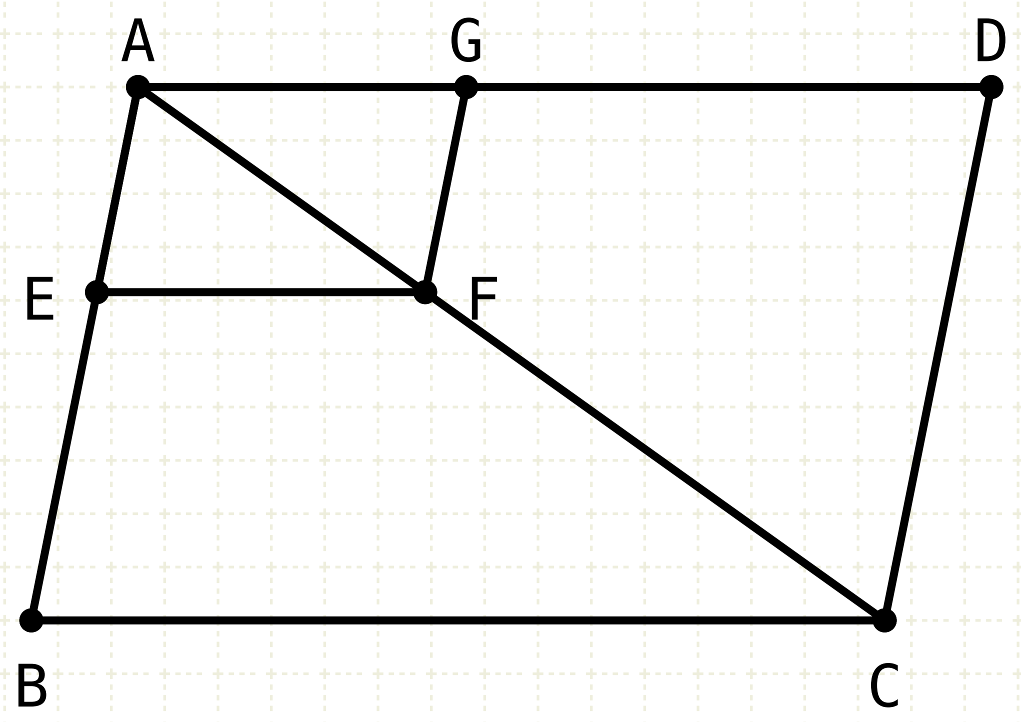

AGFE ~ ABCD

In other words

Given a parallelogram ABCD

And a smaller similar parallelogram AGFE, sharing a common angle DAB, and the lines AG and AD being collinear

The diameters of these two parallelograms will be collinear

Proposition 26 of Book VI

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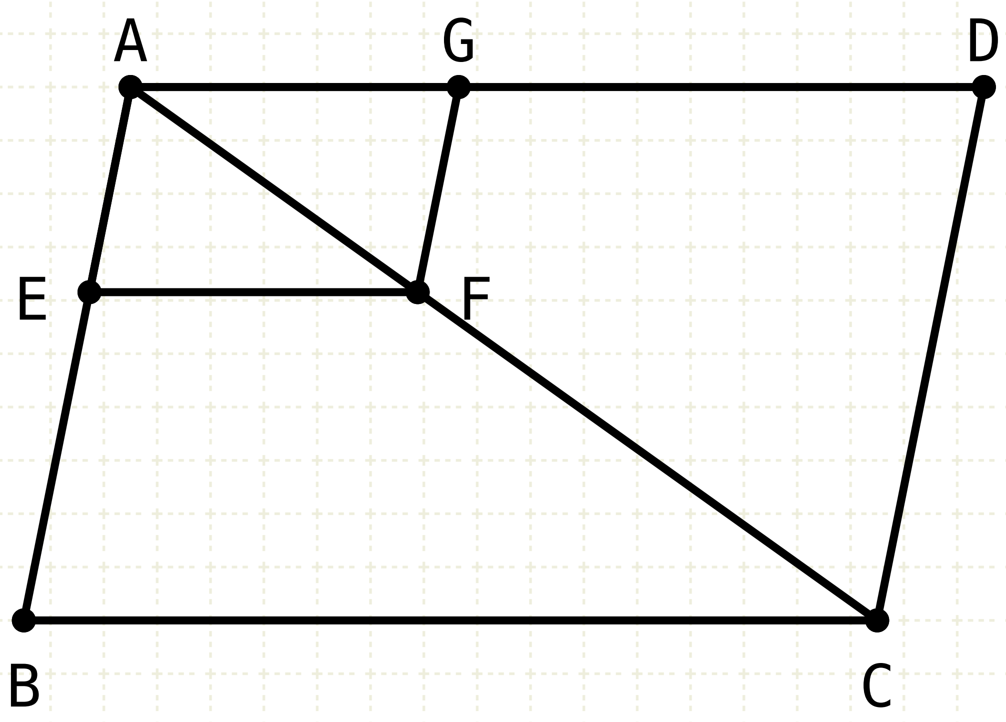

Proof by Contradiction

AGFE ~ ABCD

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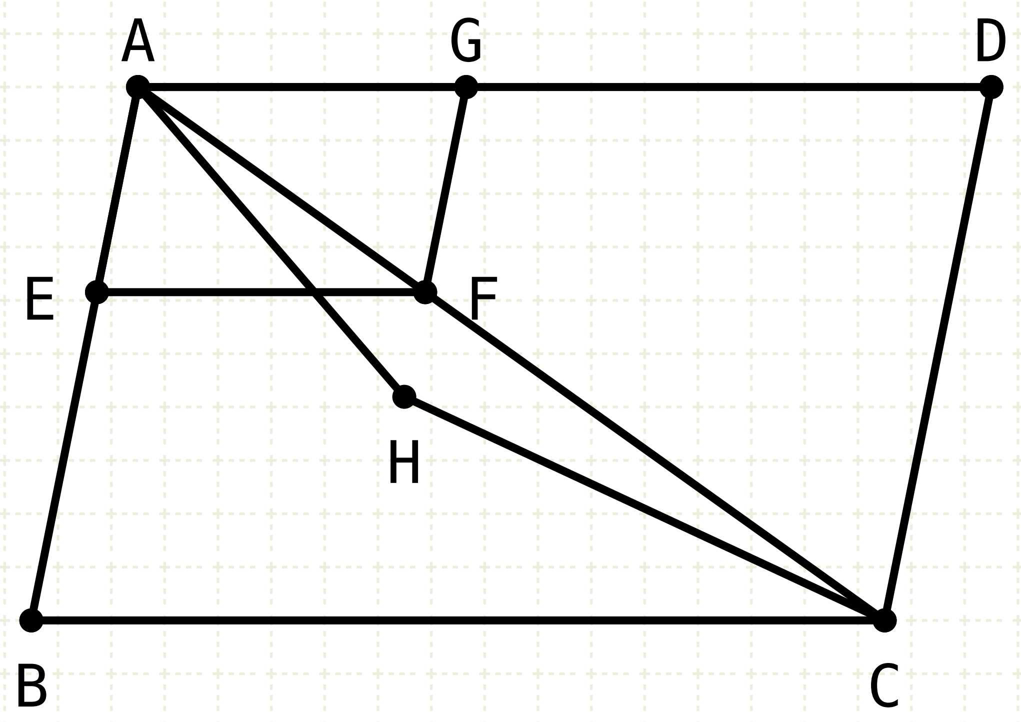

AGFE ~ ABCD

Proof by Contradiction

Assume that the diameter of ABCD is the 'line' AHC

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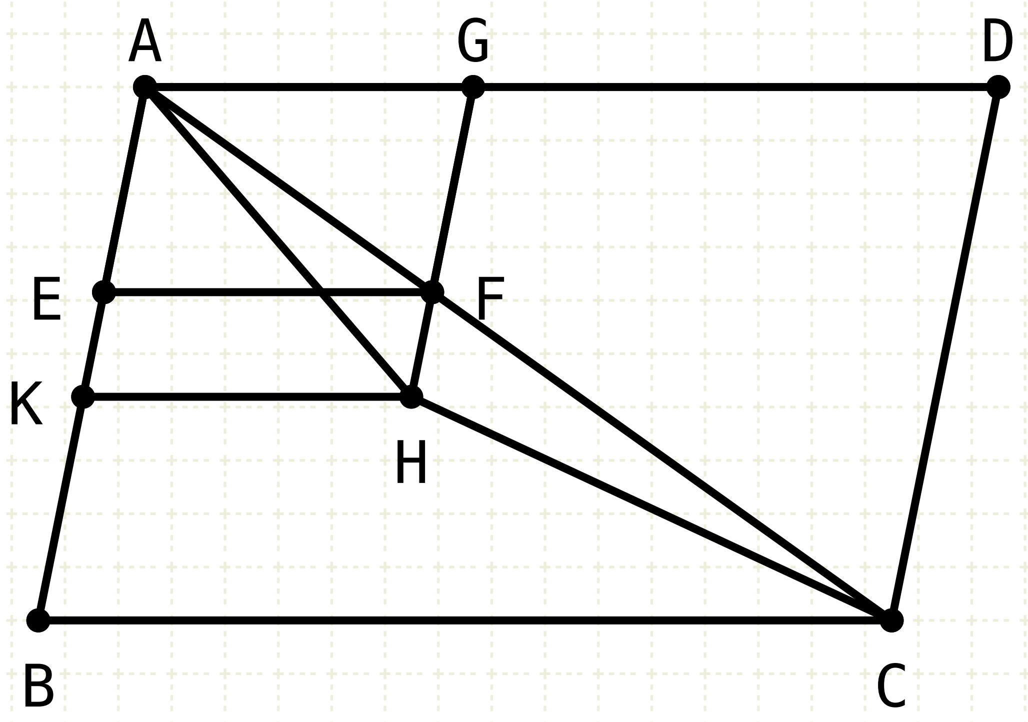

AGFE ~ ABCD

Proof by Contradiction

Assume that the diameter of ABCD is the 'line' AHC

Extend GF to the 'diameter' of ABCD to point H, and draw a line from H to the line AB, parallel to AG (I·31)

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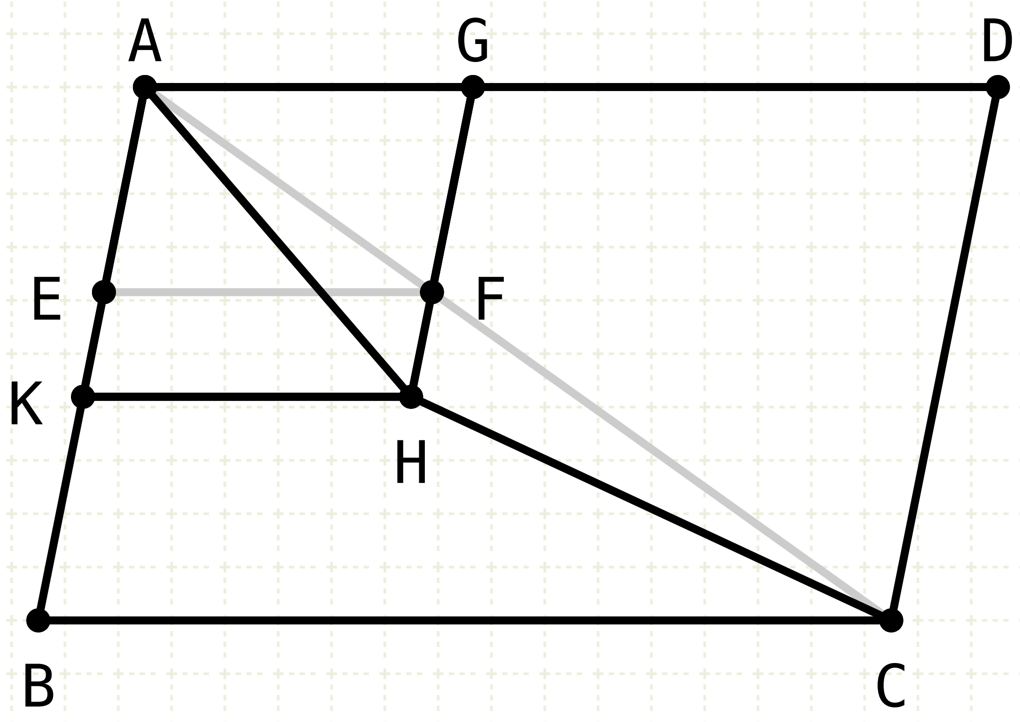

AGFE ~ ABCD

DA:AB = GA:AK

Proof by Contradiction

Assume that the diameter of ABCD is the 'line' AHC

Extend GF to the 'diameter' of ABCD to point H, and draw a line from H to the line AB, parallel to AG (I·31)

Since AGHK and ABCD share the same diameter, then DA is to AB as GA is to AK (VI·24)

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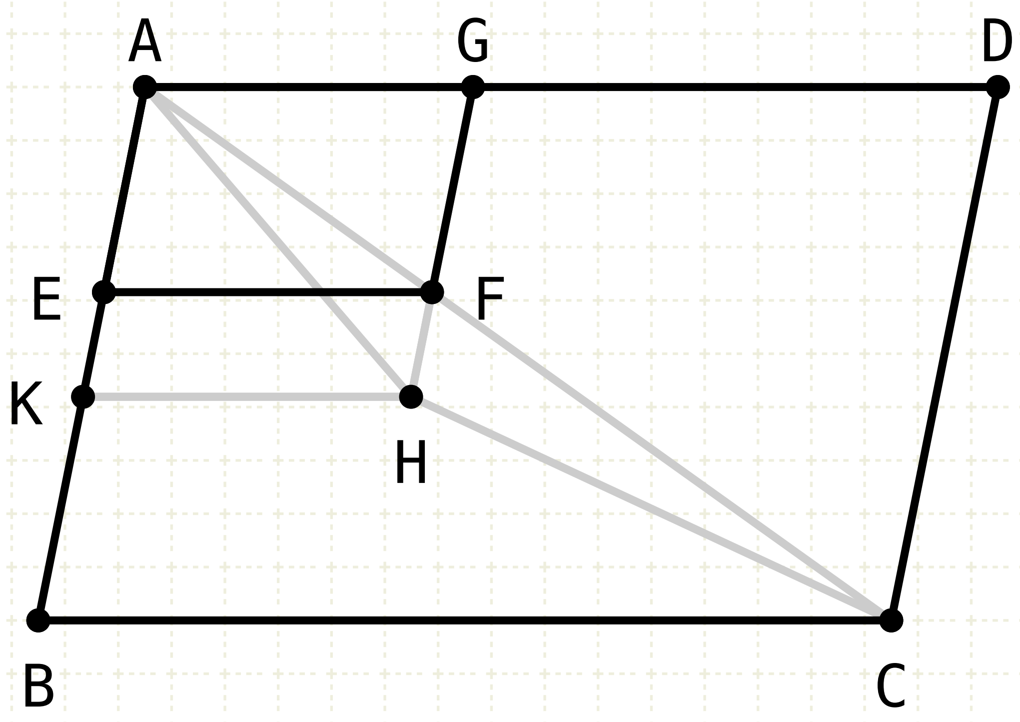

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Assume that the diameter of ABCD is the 'line' AHC

Extend GF to the 'diameter' of ABCD to point H, and draw a line from H to the line AB, parallel to AG (I·31)

Since AGHK and ABCD share the same diameter, then DA is to AB as GA is to AK (VI·24)

But AEFG is similar to ABCD, so by definition its sides are also proportional, as DA is to AB, so is GA to AE

AGFE ~ ABCD

DA:AB = GA:AK

DA:AB = GA:AE

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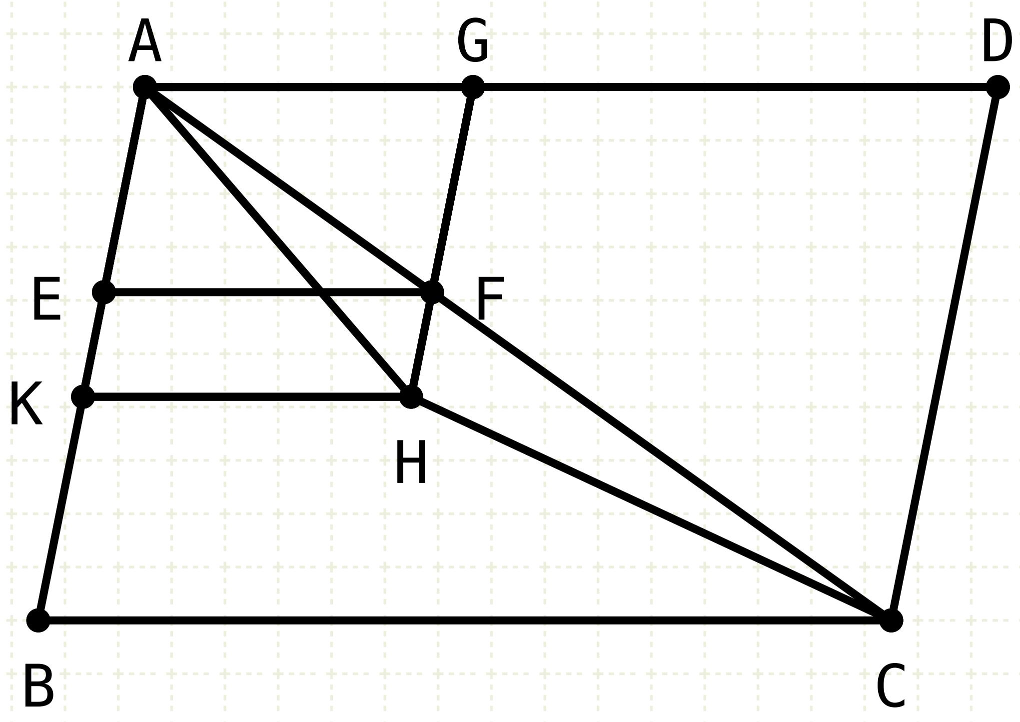

AGFE ~ ABCD

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But AEFG is similar to ABCD, so by definition its sides are also proportional, as DA is to AB, so is GA to AE

Therefore GA is to AK as GA is to AE (VI·11)

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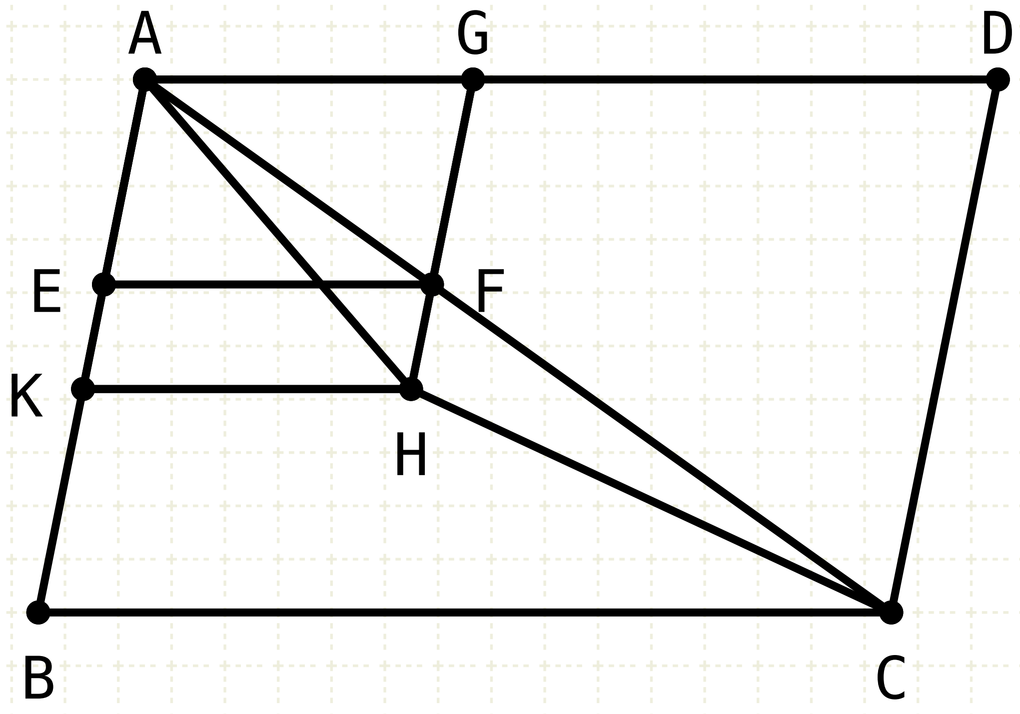

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Since AGHK and ABCD share the same diameter, then DA is to AB as GA is to AK (VI·24)

But AEFG is similar to ABCD, so by definition its sides are also proportional, as DA is to AB, so is GA to AE

Therefore GA is to AK as GA is to AE (VI·11)

Therefore AE equals AK (VI·9), but AE is smaller than AK

AGFE ~ ABCD
DA:AB = GA:AK
DA:AB = GA:AE
GA:AK = GA:AE

AE = AK

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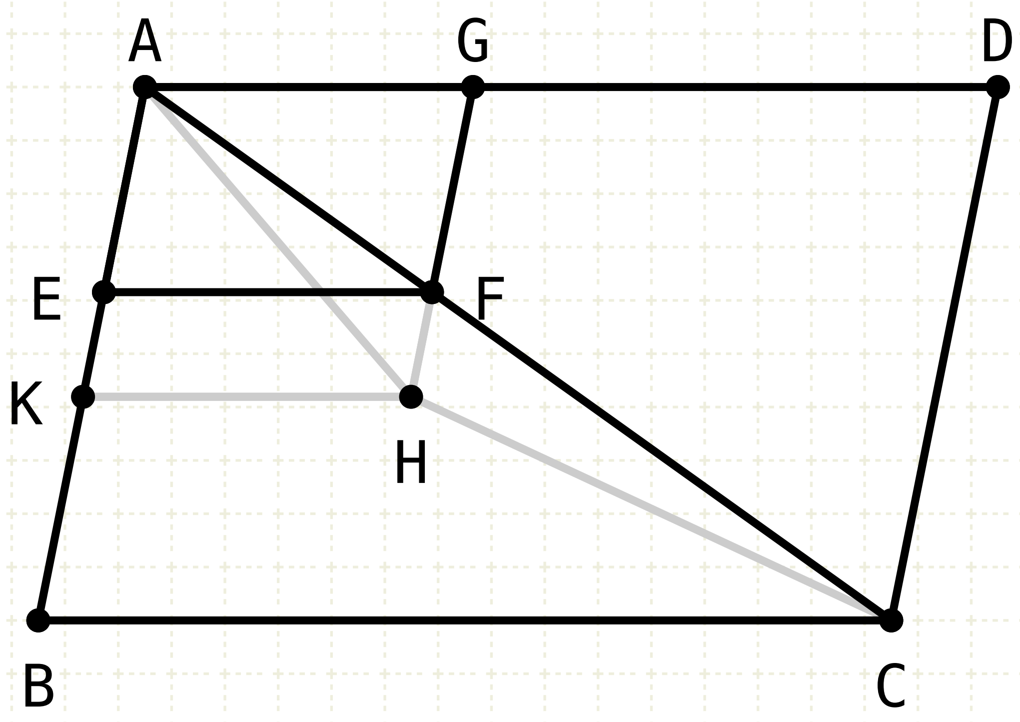

AGFE ~ ABCD

DA:AB = GA:AK

DA:AB = GA:AE

GA:AK = GA:AE

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Proof by Contradiction

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Therefore GA is to AK as GA is to AE (VI·11)

Therefore AE equals AK (VI·9), but AE is smaller than AK

Hence a contradiction, and therefore ABCD must be about the same diameter as AEFG

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