

Euclid's Elements

Book I

If Euclid did not kindle your youthful enthusiasm, you were not born to be a scientific thinker.

Albert Einstein

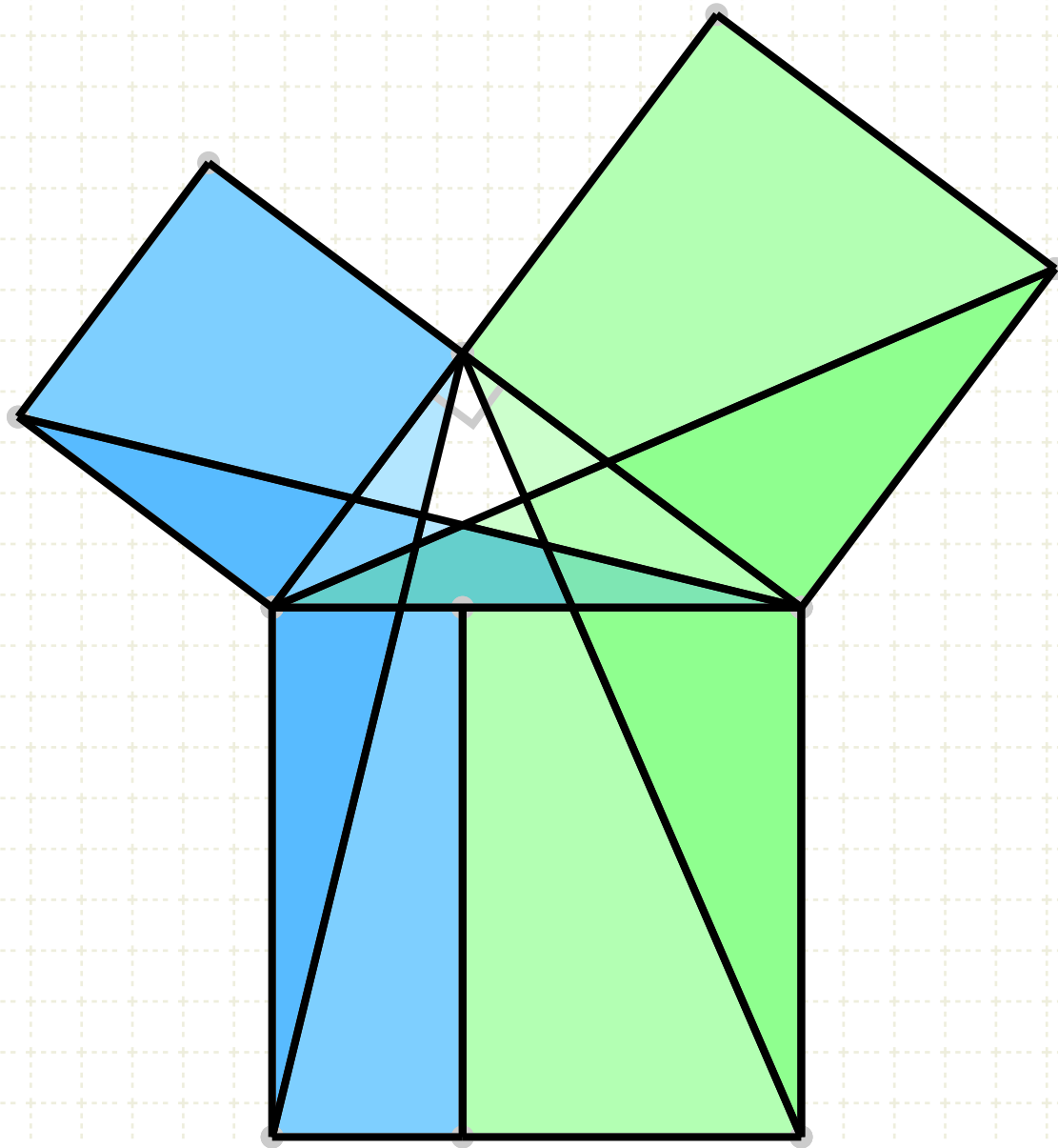


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Proposition 10 of Book I

To bisect a given finite straight line.



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To bisect a given finite straight line.

In other words

Start with a line segment AB



Proposition 10 of Book I

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Start with a line segment AB

and cut it in half



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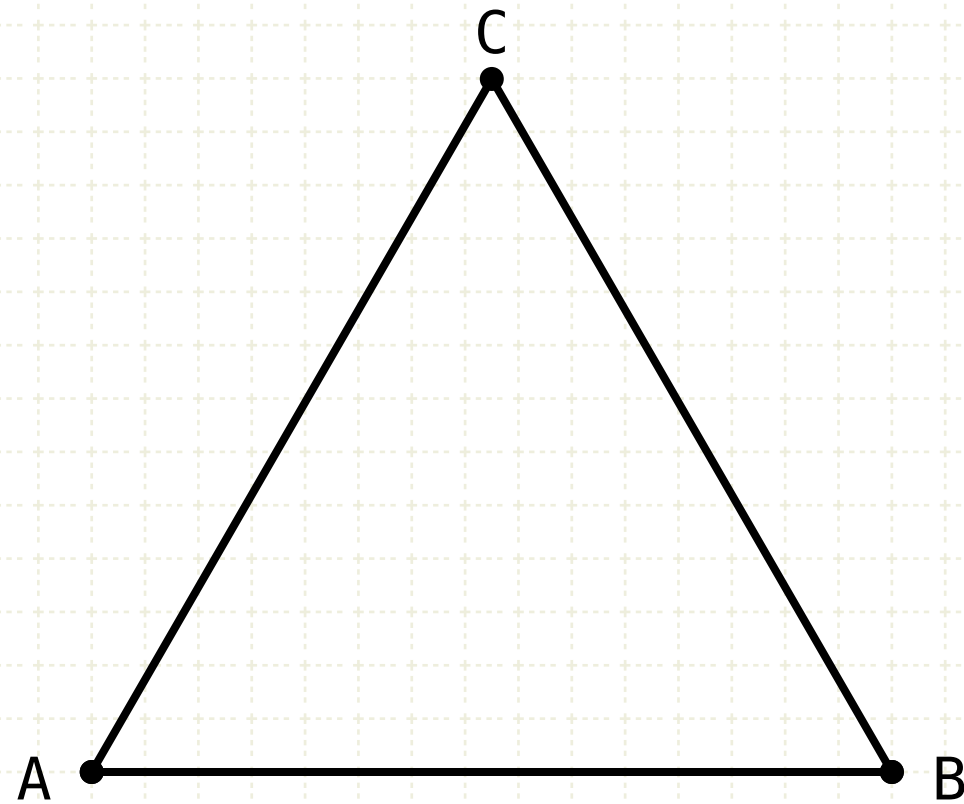
and cut it in half

Construction:



Proposition 10 of Book I

To bisect a given finite straight line.



In other words

Start with a line segment AB

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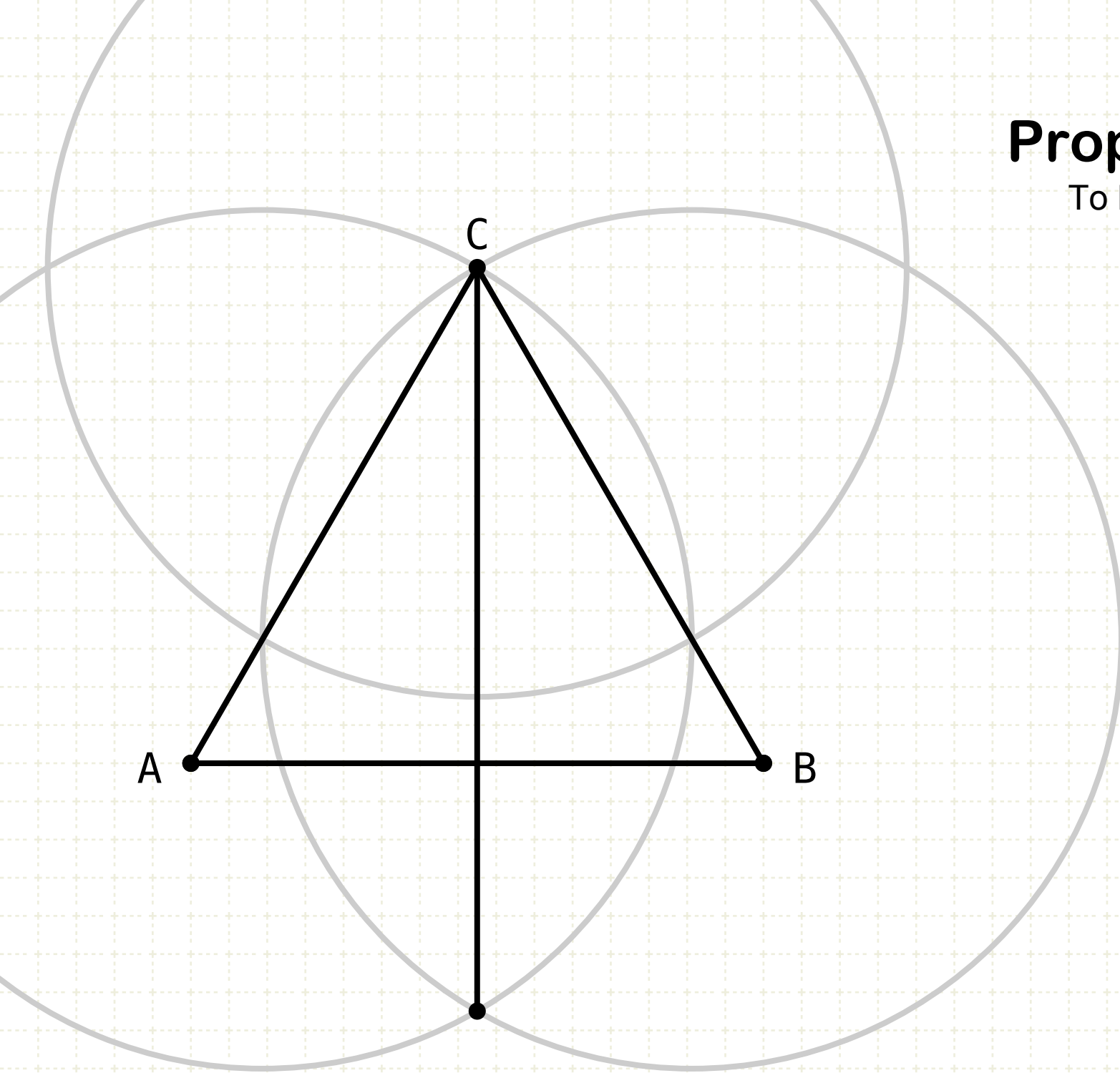
Construction:

Construct an equilateral triangle on AB and label the vertex C
(I.1)



Proposition 10 of Book I

To bisect a given finite straight line.



In other words

Start with a line segment AB
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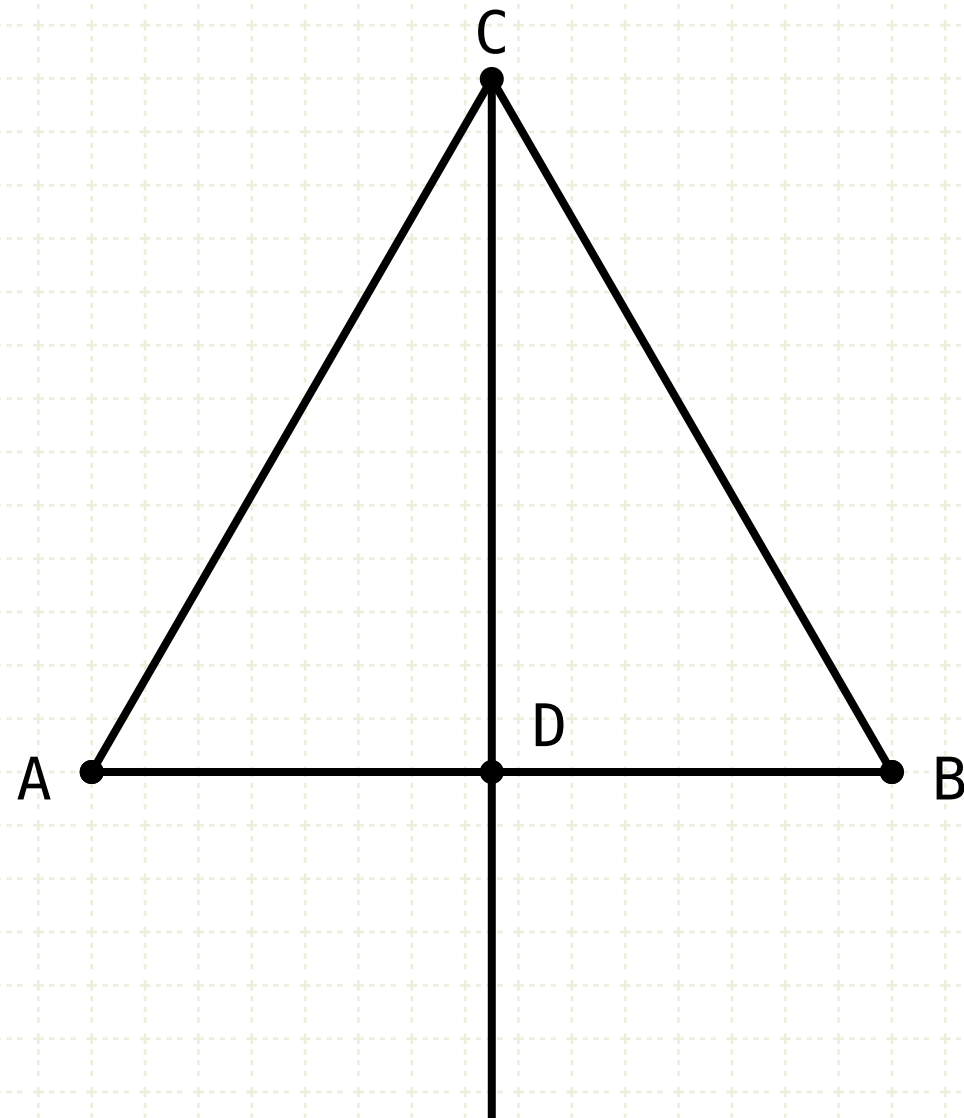
Construction:

Construct an equilateral triangle on AB and label the vertex C
(I·1)

Bisect angle ACB, and extend line past the line segment AB
(I·9)

Proposition 10 of Book I

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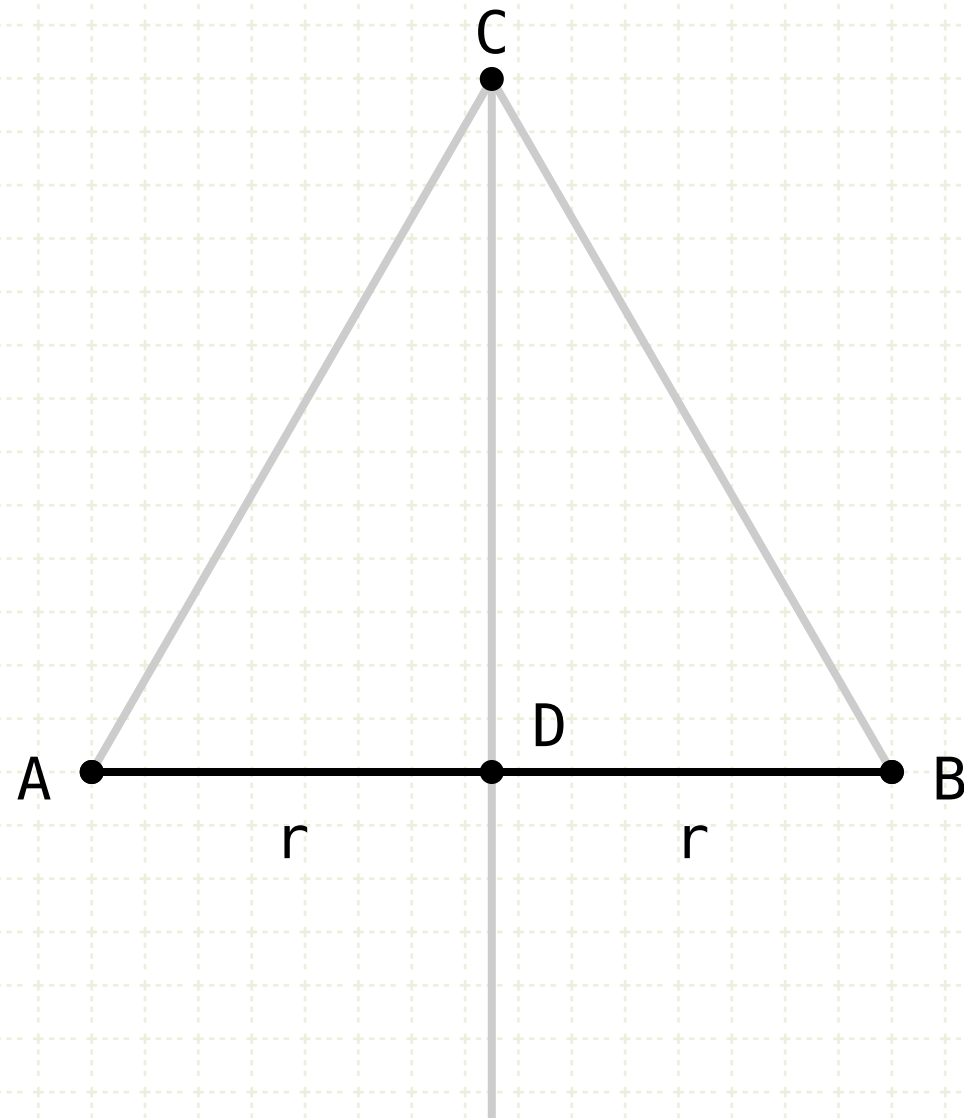
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Proposition 10 of Book I

To bisect a given finite straight line.



$$AD = DB$$

In other words

Start with a line segment AB

and cut it in half

Construction:

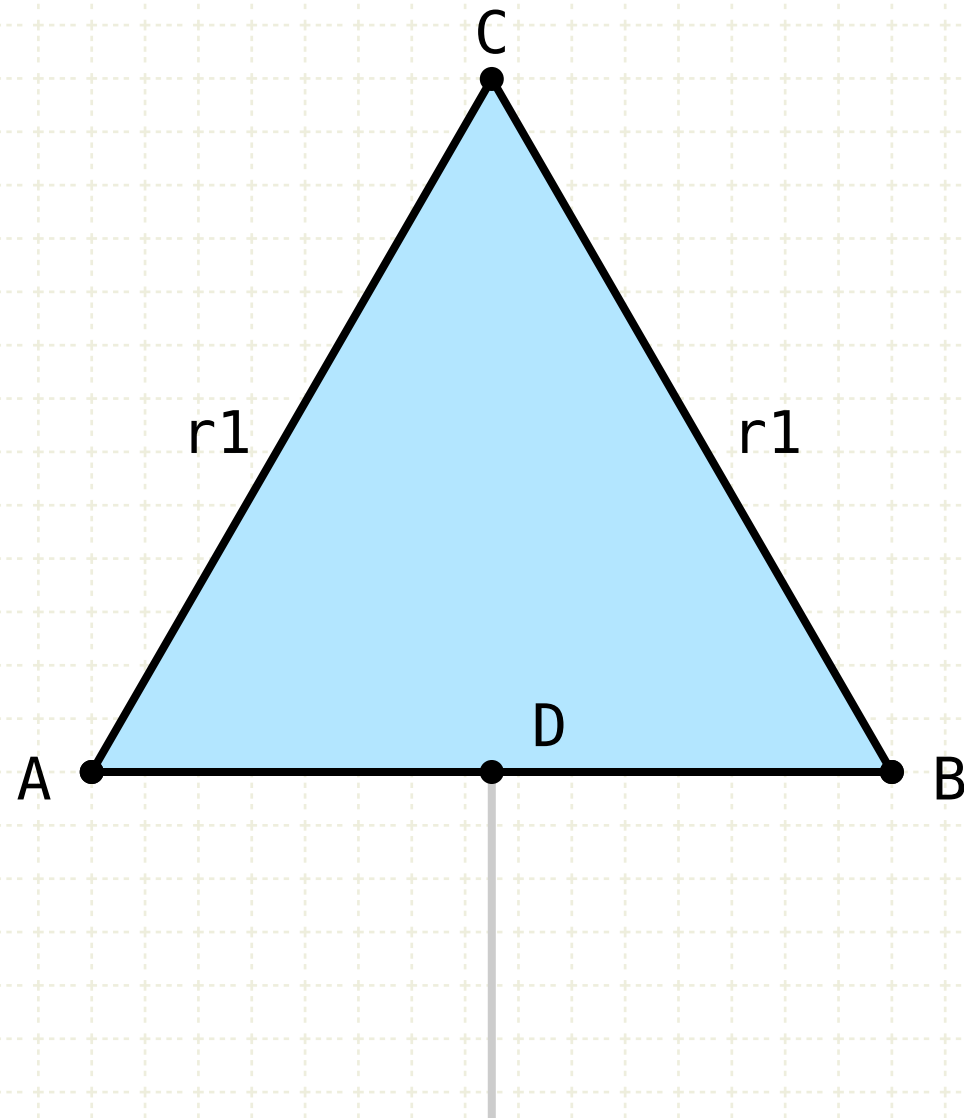
Construct an equilateral triangle on AB and label the vertex C
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Line AD is equal to line DB

Proposition 10 of Book I

To bisect a given finite straight line.



$$AC = CB$$

In other words

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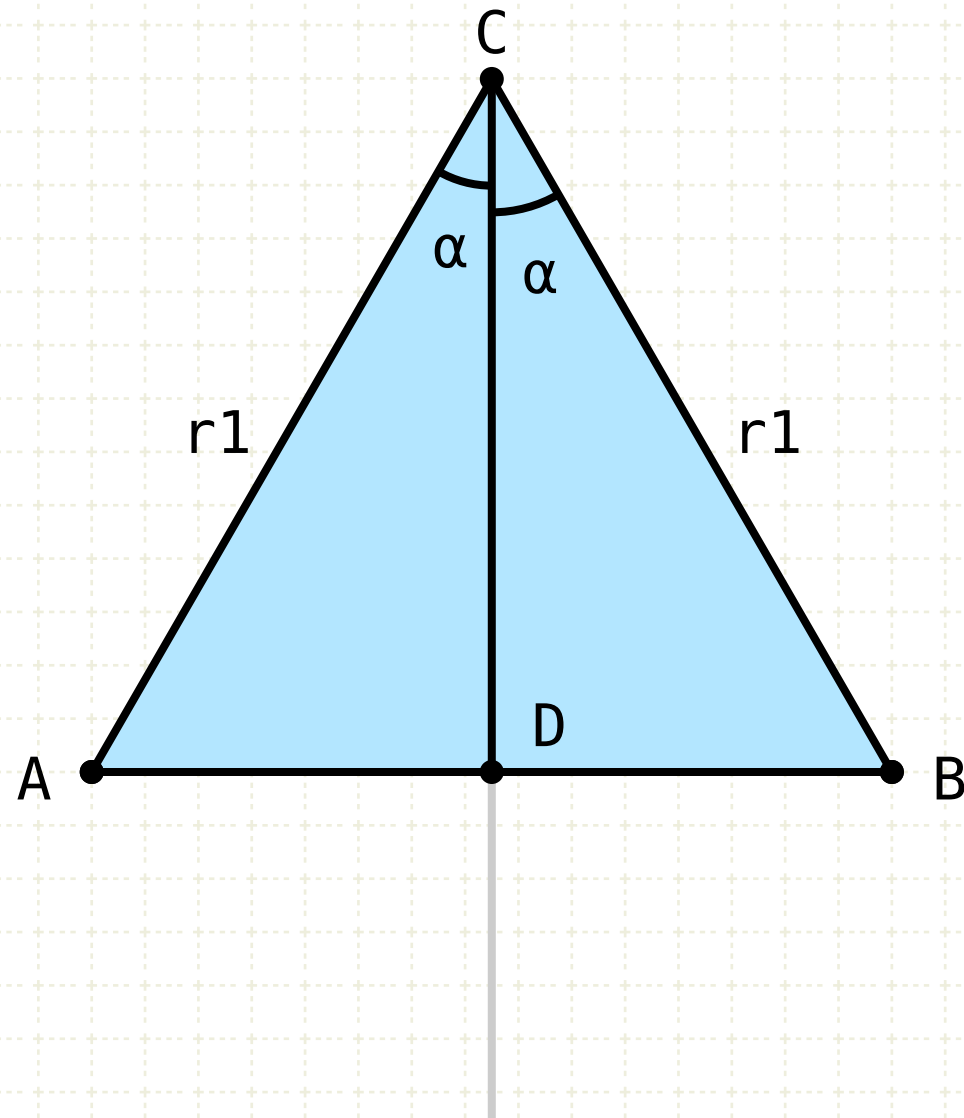
Line AD is equal to line DB

Proof

AC equals BC since they are sides of an equilateral triangle

Proposition 10 of Book I

To bisect a given finite straight line.



$$AC = CB$$
$$\angle ACD = \angle BCD = \alpha$$

In other words

Start with a line segment AB
and cut it in half

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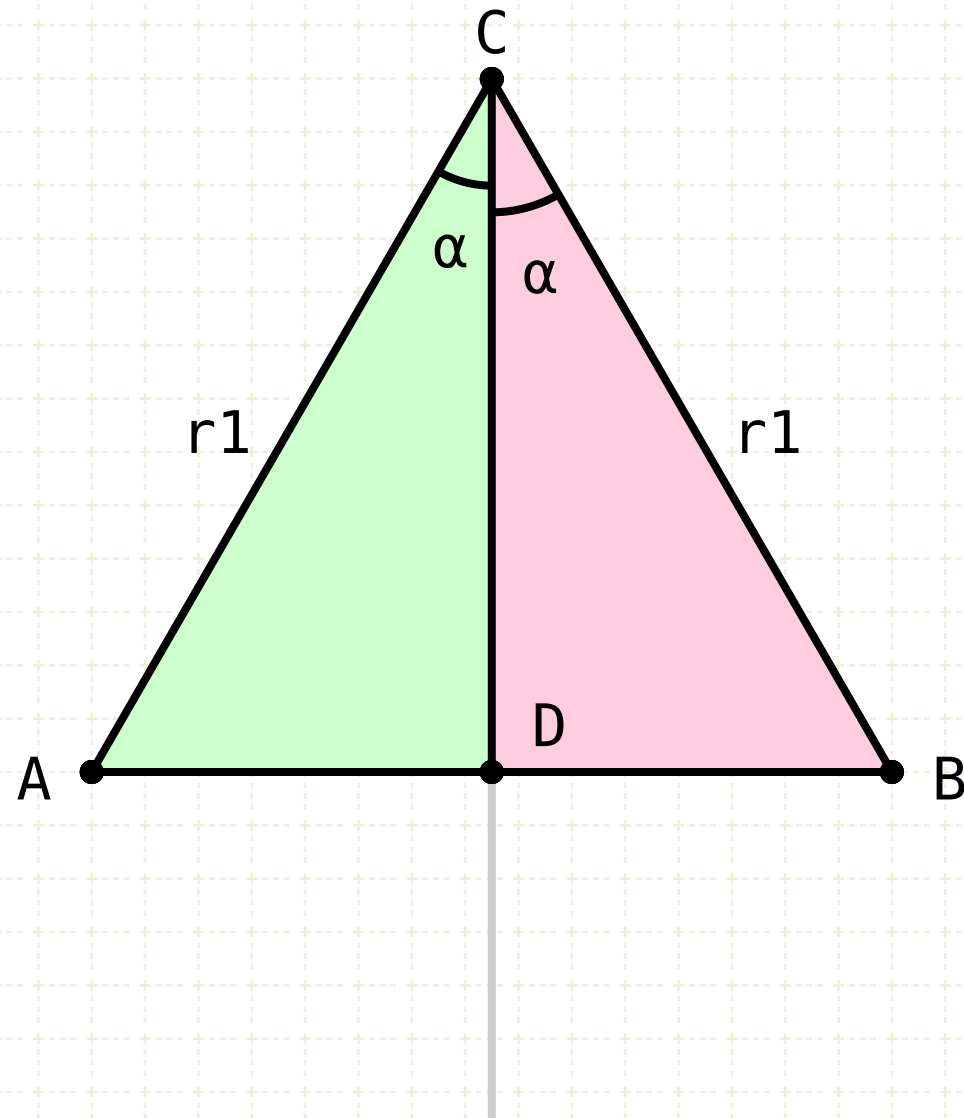
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AC equals BC since they are sides of an equilateral triangle

Angle ACD equals BCD since we bisected angle ACB

Proposition 10 of Book I

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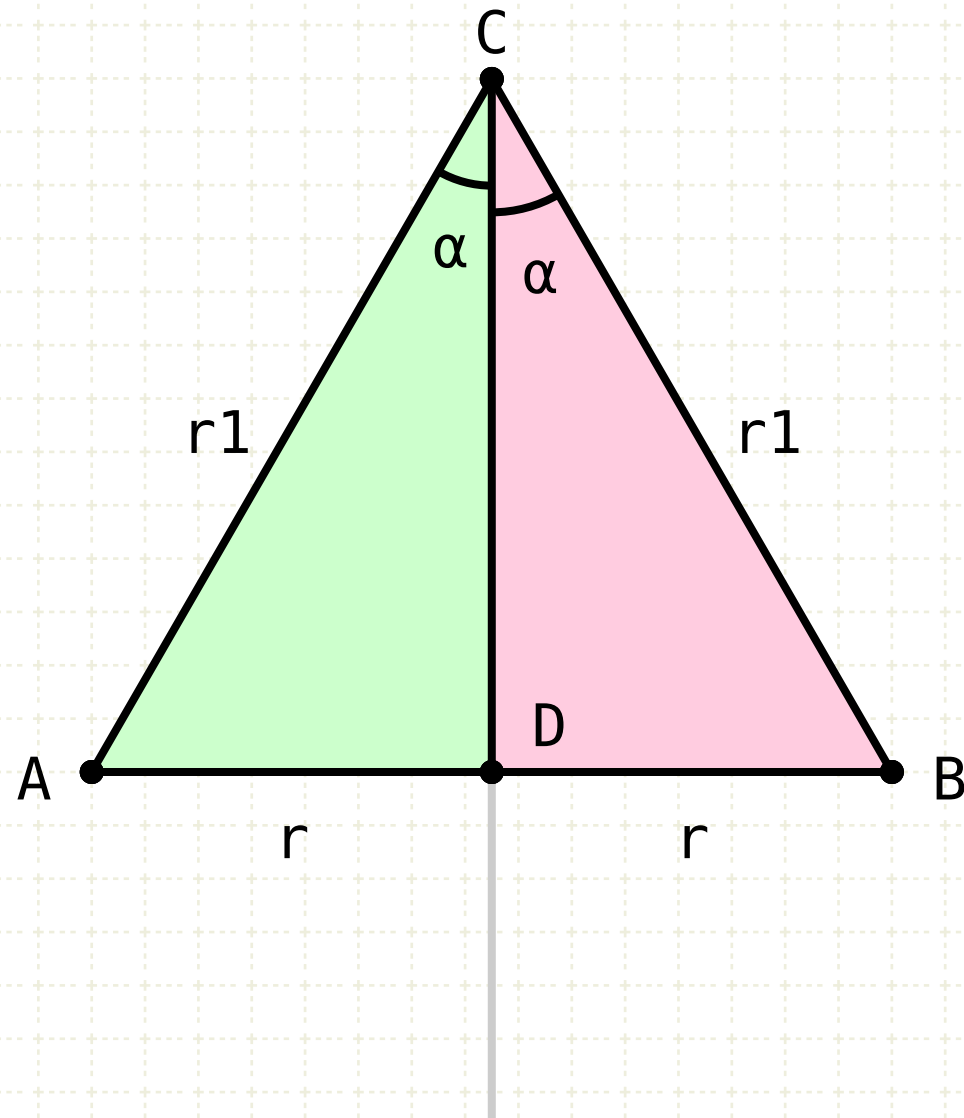
AC equals BC since they are sides of an equilateral triangle

Angle ACD equals BCD since we bisected angle ACB

Since the two triangles ACD and CDB have two equal sides,
and an equal angle between them,

Proposition 10 of Book I

To bisect a given finite straight line.



$$\begin{aligned}AC &= CB \\ \angle ACD &= \angle BCD = \alpha \\ AD &= DB = r\end{aligned}$$

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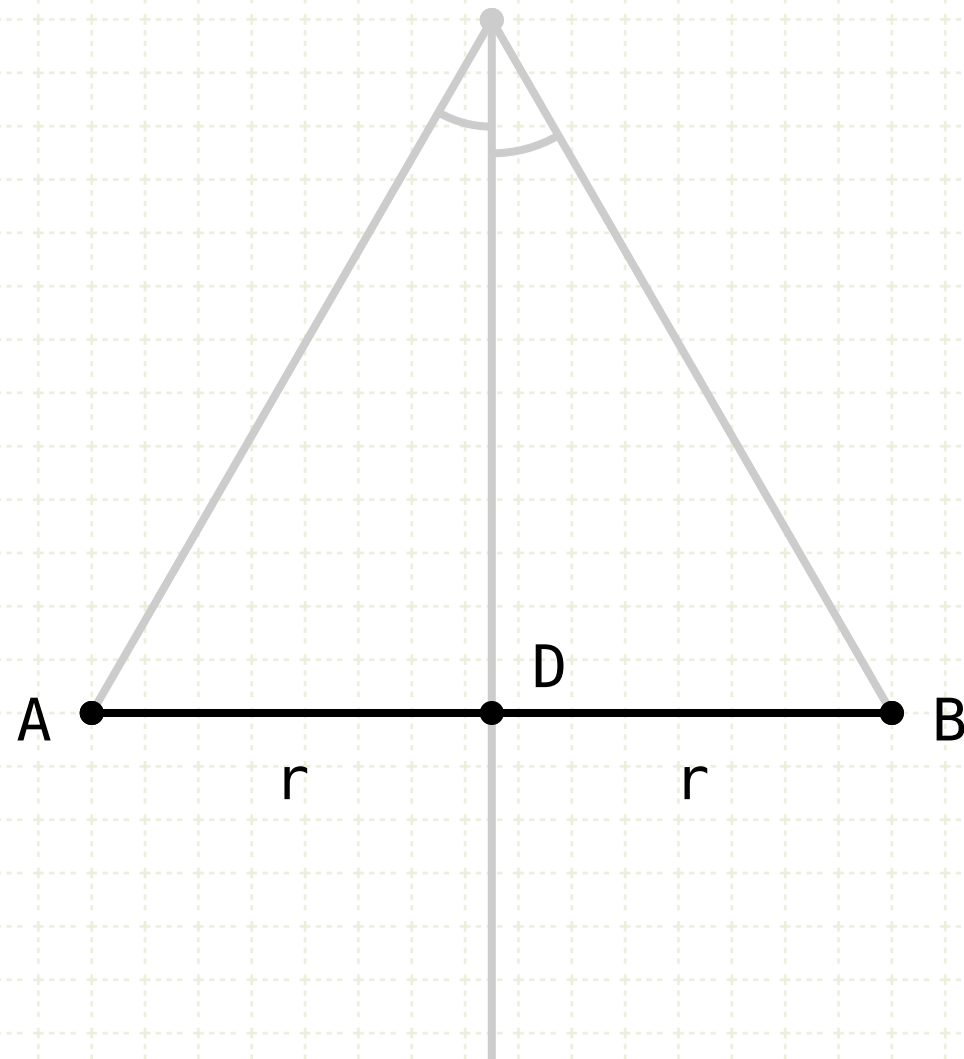
Angle ACD equals BCD since we bisected angle ACB

Since the two triangles ACD and CDB have two equal sides,
and an equal angle between them,

then the third side of each triangle is equal (I·4)

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