Congruent Rhombi Theorem

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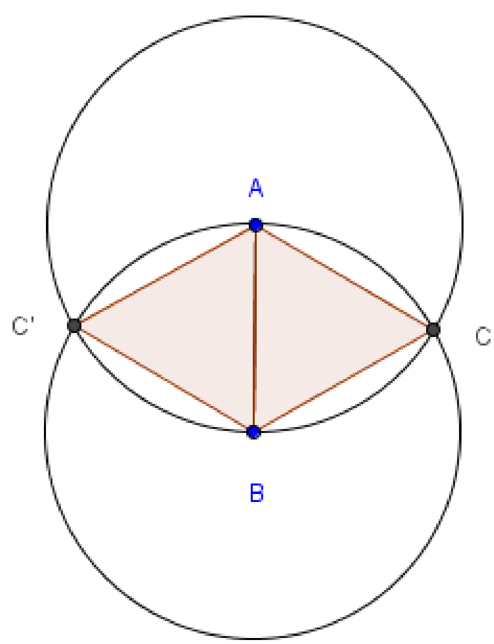
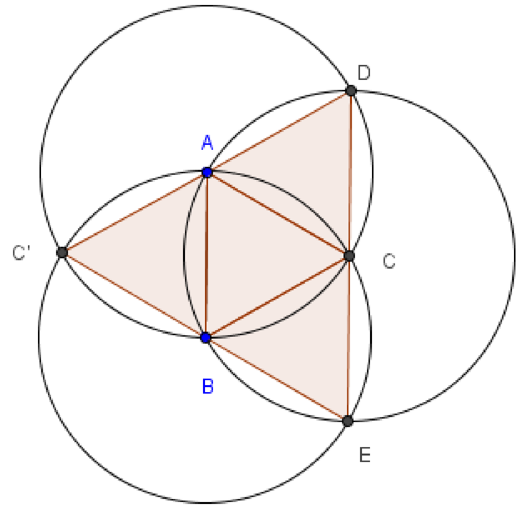
Theorem . Given a segment AB, Mr Bakers construction produces exactly one rhombus, up to congruence.

Proof. Let there be a segment AB. Construct circle AB and circle BA. Label points C and C' where the circles intersect. By Euclid I.1 we can create equilateral triangle ABC or equilateral triangle ABC'.

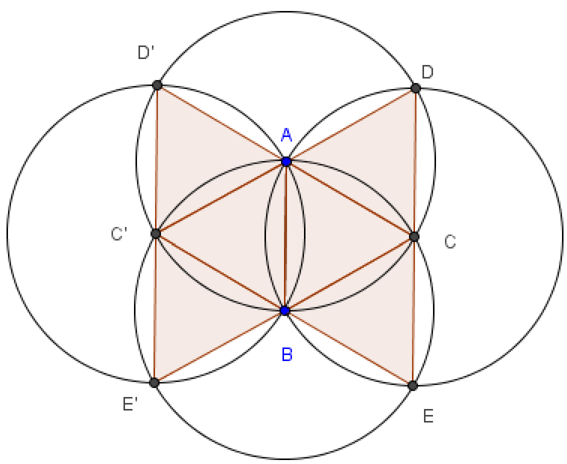


By Baker's Construction, we can select either point C or point C' to construct our third circle.We will begin with point C. Construct circle CA and label the point where it intersects with circle AB point D. We can now construct rhombus ABCD with side lengths congruent to AB.
By Euclid I.1, circle AC and circle CA create two congruent equilateral triangles ABC and ACD. Together these equilateral triangles construct rhombus ABCD. We can also label the intersection of circle CA and circle BA as point E. This constructs rhombus ABEC also with side lengths AB.

We also have equilateral triangles ABC and BCE constructing rhombus ABEC. Notice that rhombus ABCD and rhombus ABEC share equilateral triangle ABC. Since the rhombi have congruent sides and are constructed using two congruent equilateral triangles, the rhombi are congruent.



This argument will produce the same result if we had used point C' in Baker's construction. therefore, we can only create congruent rhombi for a given segment AB using Baker's construction.



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Refereed by Ms. Ange Rhenstrom and Mr. Trent Baker