231. Given Two Collinear Sets of Three Points A, B, C and a, b, c Find α, β, γ in Involution with Both Sets

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231. [K. 7. e.] Given two collinear sets of three points A, B, C and a, b, c find α, β, γ in involution with both sets.

If the points were on a conic or circle the construction would be as follows.

Let DD' be the homographic axis of the ranges determining the pairs (A, a) , (B, b) , (C, c) .

Take a point a on the curve and let aA , aa cut DD' in O and O' .

If now a, A, a be supposed to move on the conic so that aA and aa always pass through two fixed points O, O' , the successive positions of a and A form pairs in involution, and so also do those of a and a .

Also A and a describe homographic ranges of which D and D' are double points and of which the original positions of A and a are conjugates, that is the homographic ranges determined by the three given pairs. Thus BO, bO' and CO, cO' intersect in the conic, and if these points of intersection are β, γ , then α, β, γ are the required set.

The extension to the case in which ABC, abc are collinear is obvious.

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232. [K. 7. a. a.] A particle, attached to a fixed point by a string, moves in a vertical circle. If the string slackens, find where the particle meets the circle again.

O is the centre of the circle; the particle leaves the circle at P . m = the mass of the particle; OA is a vertical radius. $\angle AOP = \theta$. v = the velocity at P .