PROBLEM CORNER

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Problem 1

The ABCD is a cyclic quadrilateral. The line containing the segment AD and the line containing the segment BC intersect at point M. The line containing the segment AB and the line containing segment DC intersect at point P. The angles bisectors intersect the sides of the quadrilateral in the points: K, I, N, G (see Figure 1).

Prove that: (1) PK= PN, (2) $\angle$MOP= 90, (3) KING quadrilateral is a rhombus.

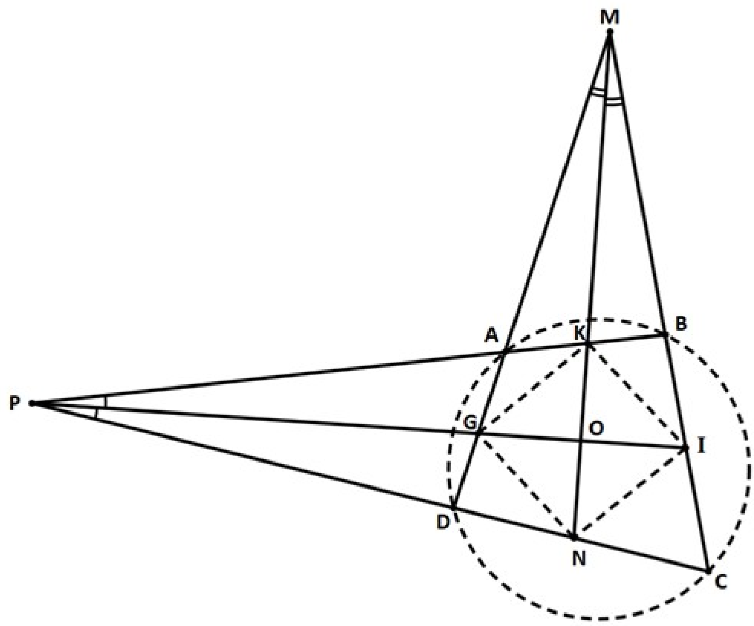

Figure 1.

Problem 2

Three circles with the same radius R and centers at points O_1, O_2 and O_3 are all intersected at one point D. Circles $O_1$and $O_2$are also intersected at the point A. Circles O_1 and $O_3$are also intersected at point B and circles O_2 and $O_3$are also intersected at point C, as shown in the Figure 2.

It must be proved that the circle passing through the 3 points A, B, C has always (constantly) the same radius R, when there is a change in the location of the intersection points A or B or C.

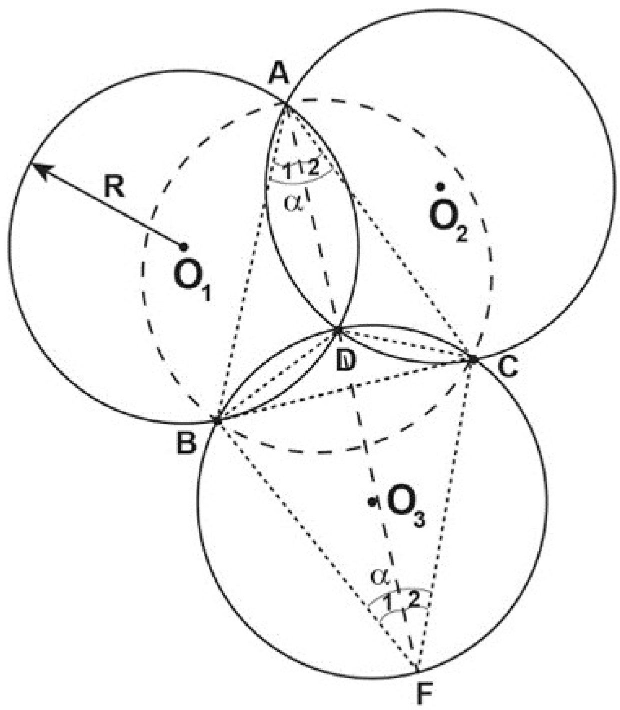

Figure 2.