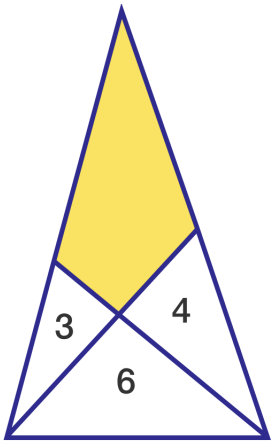
COMPLEMENTS OF GEOMETRY - SEMINAR 2

1. The numbers 3, 4 and 6 represent the areas of the triangles in the figure below. What is the area of the yellow region?



2. Let CK be an altitude in $\triangle ABC$ where $m(\angle BCA) = 90°$. In $\triangle ACK$, we construct (CE the angle bisector of $\angle ACK$ with $E \in (AK)$. The line that passes through B and is parallel to CE meets CK in the point F. Show that the line EF meets the segment AC in its midpoint.

3. In a triangle the *simedians* are the cevians which are izogonal to the corresponding *medians*. Show that in any triangle the simedians are concurrent.

4. Show that in any triangle, the cevians determined by the points of tangency with the three ex-circles of the triangle are concurrent.

Problems for presentation in the next seminar

Presentation 1. In a non-isosceles acute angled triangle $\triangle ABC$, consider the heights AD, BE, CF and let H be the orthocenter. AD and EF intersect at S. Draw $AP \perp EF$ and $HQ \perp EF$ with $P, Q \in EF$. If the lines DP and QH intersect at R, show that $HQ = HR$.

Presentation 2. Given a triangle $\triangle ABC$, draw equilateral triangles $\triangle ABF$, $\triangle BCD$, $\triangle ACE$ outwards based on AB, BC, AC respectively. Show that AD, BE and CF are CF are concurrent.

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