Feedback 13-14

For all questions:

And once again: please, please support your solutions with diagrams!!!.
And in addition: please, write the answer after the solution whenever is possible!

- **Question 13.6:**
  - There where many different solutions, so I really enjoyed them!
  - The most popular mistake was to only look at the almost adjacent sides of the polygon and ignore all other cases. Also, in many works the case of almost adjacent sides was considered in all details, while the general case only sketched.
  - As usually, a diagram helps a lot in this question. At the same time it is an example of a question when it does not make sense to draw a very good "to scale" diagram in a model - as you need to draw something which should not exist!
- **Question 14.9:**
  - Some students used SSS to show congruence of triangles, but does it also work for non-compact triangles (ones with some vertices at the absolute)? (In fact, it does not!)
  - Also, some solutions used AAA - this one in fact holds, but one needs to prove it (and a part of this task is Question 14.9).
  - Many solutions referred to "regular ideal triangle" or "symmetric ideal triangle" - which does not make any sense after you proved that they are all congruent! What one actually means here, is that we will use a disc model (both Poincaré disc and Klein disc work well here), and in the model we place the ideal triangle so, that it its vertices are represented by vertices of a regular Euclidean triangle.
  - Some solutions also referred to midpoints of the side of the ideal triangle, which does not make any sense - where is the midpoint of a bi-infinite segment? (It can be chosen at any point of the line, actually). What you need to do instead of looking at midpoints, is to consider the foot of the perpendicular dropped from the third vertex.
  - "Angle bisectors" for zero angles also make no sense - though, one still can speak about the points on equal distance from the sides of the angle.
- **Question 14.10:**
  - Answering this question many students classified *orientation-preserving* isometries preserving 0 and ∞. One should also remember about orientation-reversing ones.
  - When speaking about an isometry fixing a line one needs to distinguish whether the line is fixed as a set or pointwise!
  - About a half of the students noticed that the general question about two general points can be reduced to the specific question about preserving 0 and ∞ in the UHP by conjugation. But most of them did not conclude explicitly that the answer (the number of isometries) will be the same in both cases, and even smaller number of students remembered to return to the general question at the end to give the answer also to that - when the partial question was solved.
- **Question 14.12:** There were two typical mistakes:
  - Reasoning as follows:

    "It is clear from angle sum that there is no right-angled regular triangle and quadrilateral. This does not give any obstruction for $n > 4$, hence there exists an example for each $n > 4$."

    Of course, this is a wrong conclusion, and one should prove the existence constructively or by intermediate value.
  - And reasoning this way:

    "We can show using intermediate value, that there is an example for each $n \geq 5$. The construction does not work for $n = 3, 4$, so here there are no examples".

    Again, logically wrong, and one needs to check using the angle sum.