

Tickets (preliminary version)

1. Metric spaces: examples, isometries, motions, lines, half-lines, segments, angles.
2. Zero angle, straight angle, vertical angles, reflection across a point.
3. Axiom IIIc, same sign lemmas.
4. Half-planes and Pasch's theorem.
5. Congruent triangles: definition, Axiom IV, equivalence relation, SAS and ASA congruence conditions.
6. Theorem about isosceles triangles and SSS congruence condition.
7. Perpendicular bisector.
8. Uniqueness of a perpendicular.
9. Reflection across a line, direct and indirect motions, the perpendicular is shortest.
10. Circles: definition, intersection of circle and line, intersection of two circles.
11. Similar triangles: definition, equivalence relation, similarity conditions.
12. Pythagorean theorem, method of similar triangles (idea and one more example).
13. Parallel lines: definition and existence.
14. Parallel lines: uniqueness.
15. Parallel lines: equivalence relation and transversal property.
16. Theorem about the sum of angles of a triangle.
17. Parallelograms: definition and properties.
18. Circumcircle, circumcenter, altitudes and orthocenter.
19. Medians and centroid.
20. Lemma about angle bisectors.
21. Bisectors and incenter of triangle.
22. Inscribed angles and the angle between a tangent line and a chord.
23. Inscribed quadrangles and the method of additional circle (idea and one example).
24. Inversion: definition and lemma about similar triangles.
25. Cross-ratio and inversion.
26. Angles of quadrangles and inversion.
27. Inversive plane: circlines and inversion.
28. The method of inversion (idea and one example).
29. Perpendicular circles and inversion.
30. Angles between arcs and inversion.
31. Neutral plane: theorem about two angles of a triangle and the SAA congruence condition.
32. Neutral plane: three angles of a triangle and defect.
33. The conformal disc model: description and the auxiliary statements.
34. The conformal disc model: plan of the proof and proof of one statement from the plan.
35. Hyperbolic trigonometric functions: graphs, derivatives, and the double-argument identities.
36. The angle of parallelism and the inradius of an h-triangle.
37. Circles, horocycles, and equidistants.
38. AAA congruence condition.
39. The conformal interpretation of the model and the circumference of an h-circle.
40. The hyperbolic Pythagorean theorem: formulation and proof of $c + \ln 2 > a + b$.