

Geometry I — Homework 2 — Due 21st Oct

1. Convince yourselves that the Cartesian plane satisfies the postulates of Euclidean geometry.
2. Write down the negation of each of the following statements:
 - All numbers are prime numbers.
 - Some triangles are isosceles triangle.
 - There are no right angles.
3. Let AB and CD be two line segments intersecting at V . Show that the lines bisecting $\angle AVC$ and $\angle CVB$ are perpendicular.
4. Let ABC and $A'B'C'$ be two triangles such that $AB = 6, BC = 8, \angle ABC = 62^\circ$ and $A'B' = 9, B'C' = 12, \angle A'B'C' = 62^\circ$. What is $C'A'/CA$ and why?
5. Let ABC and $A'B'C'$ be two triangles such that $AB = 5, BC = 7, \angle ABC = \alpha^\circ, \angle BCA = \beta^\circ$ and $A'B' = 10, B'C' = 14, \angle A'B'C' = \alpha^\circ$. What is $\angle B'C'A'$ and why?
6. Definition: A polygon with four sides is called a *quadrilateral*. A quadrilateral is *convex* if all its angles measure less than 180° .
Let $ABCD$ and $A'B'C'D'$ be two similar, convex quadrilaterals such that $\angle ABC = \angle A'B'C', \angle BCD = \angle B'C'D', \angle CDA = \angle C'D'A', \angle DAB = \angle D'A'B'$. Prove that the triangles ABC and $A'B'C'$ are similar.
7. Consider a triangle ABC and let L, M, N be respectively the midpoints of AB, AC and BC . Show that the triangles ALM, LBN, CMN and ABC are similar.