Write at top of first page of answer paper (a) name of school where you have studied, (b) number of weeks and recitations a week in plane geometry. Name the author of the textbook you have used in your study of plane geometry.

Answer the first four questions and three of the others.

1 State four theorems the conclusion of each of which implies that two lines (sides, chords, tangents etc.) are equal. [12]

2 Prove one of the theorems stated in answer to question 1. [14]

3 Prove that two similar triangles are to each other as the squares of any two homologous sides. [16]

4 Given a square; construct a square whose area is three times the area of the given square. [Show all construction lines. No proof or explanation required.] [16]

5 Prove the correctness of the following construction for bisecting the angle $ABC$: On $AB$ produced beyond $B$ take $BD = BC$ and draw a line through $B$ parallel to $DC$. [14]

6 Two equal chords produced meet outside the circle; prove that the secants thus formed are equal. [14]

7 Draw a square $ABCD$. On the diagonal $AC$ take the point $E$ so that $AE = AB$ and draw through $E$ a perpendicular to $AE$ cutting $BC$ in $F$. Prove $BF = EC$. [14]

8 The sides of a triangle are 9, 12 and 18; compute the lengths of the two segments into which the longest side is divided by the bisector of the opposite angle. [14]

9 A triangle $ABC$ is inscribed in a circle; the angle $B$ is $35^\circ$, the minor arc $AB$ is $120^\circ$. What angle does a tangent at $A$ make with $BC$ produced to meet the tangent? [14]

10 How many sides are there in the polygon each of whose interior angles is $175^\circ$? [14]