The University of the State of New York

228TH HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Wednesday, January 24, 1923—9.15 a. m. to 12.15 p. m., only

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. The minimum time requirement is five recitations a week for a school year.

Name the author of the textbook you have used in plane geometry.

Answer eight questions, including not more than three from group I and at least one from group II.

Group I

Do not answer more than three questions from this group.

1 Prove that the sum of the three angles of a triangle is equal to a straight angle. [12½]

2 Prove that in the same circle or in equal circles equal chords are equidistant from the center. [12½]

3 Prove that if from a point outside a circle a tangent and a secant are drawn to the circle, the tangent is the mean proportional between the secant and its external segment. [12½]

4 Prove that the areas of two similar triangles are to each other as the squares of any two corresponding sides. [12½]

Group II

Answer at least one question from this group.

Leave all construction lines on the paper.

5 On a given line as the base, construct a rectangle whose area shall equal the area of a given scalene triangle. [12½]

6 Given two adjacent sides and the included angle of a parallelogram; construct the parallelogram. [12½]

Group III

Irrational results may be left in the form of π and radicals unless otherwise stated.

7 If CA and CB, the equal sides of an isosceles triangle ABC, are produced through A and B to points D and E respectively so that AD = BE, show that triangles ABD and ABE are congruent. [12½]

8 The diagonals of the parallelogram ABCD intersect at O. Show that if the mid points of AO, BO, CO and DO are joined in order, another parallelogram is formed whose area is one fourth the area of ABCD. [12½]

9 A parallelogram with adjacent sides 5 and 12 is inscribed in a circle. Find the area of the circle. [12½]

10 A side of a regular hexagon is 8. Find the perimeter and the area of the triangle formed by joining alternate vertices of the hexagon. [12½]

11 The radii of two circles are 8 and 20 respectively. The distance between their centers is 40. How far from the center of the smaller circle does the common external tangent cut the line of centers? [12½]