New York State Education Department

208TH HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Tuesday, January 21, 1913—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. Name the author of the textbook you have used in your study of plane geometry.

Answer eight questions, selecting two from each group.

Group I

1 Define *four* of the following: tangent, polygon, sector, apothem, complementary angle.

2 Prove that an inscribed angle is measured by one half its intercepted arc, first if one side of the angle is a diameter, second if the center lies outside the angle.

3 Prove that if two triangles have an angle of the one equal to an angle of the other and the including sides proportional, they are similar.

Group II

4 Construct a square equivalent to a given scalene triangle. [Show all construction lines. No proof required.]

5 Prove that if through a point within a circle two chords are drawn, the product of the two segments of one of these chords is equal to the product of the two segments of the other chord.

6 Prove that if the opposite sides of a quadrilateral are equal, the figure is a parallelogram.

Group III

7 $ABCD$ is a quadrilateral inscribed in a circle; the sides AB and DC are produced to meet at E. Prove that the triangles ACE and BDE are similar.

8 Prove that any straight line drawn through the middle point of a diagonal of a parallelogram and terminated by the opposite sides is bisected at that point.

9 If two unequal circles touch externally at C and a line AB is drawn touching the circles at A and B respectively, show that if A and B are joined to C the angle ACB is a right angle.

Group IV

10 One side of a rhombus is 20; the longer diagonal is 32. Find the other diagonal and the area.

11 From a point 21 inches from the center of a circle whose radius is 15 inches a secant is drawn; find the product of the whole secant and its external segment.

12 It requires 41½ rods of fence to inclose a semicircular field; find the area of the field. [$\pi = \frac{22}{7}$]