207TH HIGH SCHOOL EXAMINATION

# PLANE GEOMETRY

## Tuesday, June 18, 1912 — 9.15 a. m. to 12.15 p. m., only

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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.

*Answer eight questions, selecting two from each group.*

### Group I

1 Prove that if two parallel straight lines are cut by a transversal the alternate interior angles are equal.

2 Prove that two regular polygons of the same number of sides are similar.

3 Construct a triangle when two sides and the included angle are given. About this triangle circumscribe a circle.

### Group II

4 Prove that in the same circle or in equal circles equal chords are equidistant from the center.

5 Prove that if from a given point a secant and a tangent are drawn to a circle, the tangent is the mean proportional between the whole secant and its external segment.

6 Prove that the area of a triangle is equal to one half the product of its base by its altitude.

### Group III

7 Prove that if two circles intersect, tangents drawn to the two circles from any point in the common chord produced are equal.

8 Prove that the triangle formed by drawing a line from any vertex of a parallelogram to the middle point of one of the opposite sides is equivalent to one fourth of the parallelogram.

9 Three given straight lines meet at a point; draw another straight line so that the two segments of it intercepted between the given lines are equal.

### Group IV

10 The sides of a triangle are 5, 7 and 9; if the side of a similar triangle homologous to 7 is 8, find the other two sides.

11 Two tangents to a circle make with each other an angle of 60°; the radius of the circle is 14 inches. What are the lengths in inches of the arcs between the points of contact?

12 Find the radius of a circle if its area is doubled by increasing its radius one foot.