200TH HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Tuesday, January 18, 1910—9.15 a. m. to 12.15 p. m., only

Write at the top of the first page of your answer paper (*a*) the name of the school where you have studied, (*b*) the number of weeks and recitations a week that you have had in geometry.

Five recitations a week for a school year, in a recognized academic school, is the regular requirement, and any statement showing less or other than this should be accompanied by a satisfactory claim or explanation made by the candidate and certified by the principal; otherwise such paper will be returned.

Answer eight questions, selecting two from each group.

Group I 1 Prove that in a circle a diameter perpendicular to a chord bisects the chord and the arc subtended by it.

2 Prove that the bisector of an interior angle of a triangle divides the opposite side into segments which are proportional to the other two sides.

3 Prove that the area of a parallelogram is equal to the product of its base by its altitude.

Group II 4 Prove that if two chords intersect within a circle the product of the segments of one chord is equal to the product of the segments of the other chord.

5 Construct a mean proportional between two given lines, showing all construction lines. Prove your construction.

6 On a given line as base construct a triangle similar to a given triangle. Show all construction lines and give proof.

Group III 7 In a right triangle with hypotenuse 10 and one leg 6 find the length of the altitude on the hypotenuse and of the bisector of the right angle.

8 The diameter of a circle is 10 inches; find the length of an arc of 60° and of the chord which subtends this arc.

9 The upper and lower bases of a trapezoid are 5 inches and 8 inches respectively and the altitude is 6 inches. If the legs of the trapezoid are produced till they meet find the altitudes of the two triangles thus formed.

Group IV 10 Given the diagonals of a parallelogram and an angle included by them; show how to construct the parallelogram. Prove your construction.

11 Prove that if from any point in the bisector of an angle a line is drawn parallel to one side of the angle the triangle thus formed is isosceles.

12 From a vertex A of a given square $ABCD$, a line is drawn cutting the perimeter of the square in P. If AP is produced to Q, PQ being made equal to AP, find the locus of Q when P moves over the entire perimeter of $ABCD$. Give proof.