184TH HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Wednesday, January 25, 1905 — 9.15 a. m. to 12.15 p. m., only

Answer eight questions but **no more,** *including at least one from each of the three divisions. If more than eight are answered only the first eight answers will be considered. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive* 12½ *credits. Papers entitled to* 75 *or more credits will be accepted.*

First division

1 Prove that if from the same point in a perpendicular to a line, two oblique lines are drawn cutting off unequal distances from the foot of the perpendicular, the line cutting off the greater distance is the greater.

2 Prove that in the same circle or in equal circles, equal central angles intercept equal arcs; and of two unequal central angles the greater intercepts the greater arc.

3 Complete and demonstrate the following: if a straight line divides two sides of a triangle proportionally . . .

4 Complete and demonstrate the following: if from a point without a circle a secant and a tangent are drawn . . .

5 Prove that if a circumference is divided into any number of equal arcs, the chords joining the successive points of division form a regular inscribed polygon.

Second division

6 In a trapezoid the bases are 5 inches and 8 inches, the legs 4 inches and 6 inches respectively; how far must each of the legs be produced that they may meet at a point?

7 The perpendicular distance between two parallel sides of a regular hexagon is d; find the area of the hexagon.

8 The angles A, B and C of a triangle inscribed in a circle are respectively 74°, 50° and 56°; BC produced meets the tangent AD at D. Find *each* of the angles of the triangle ABD.

9 The sides of a triangle are respectively 4 inches, 9 inches and 12 inches; find how far the shortest side must be produced to meet the bisector of the exterior angle of the opposite vertex.

10 The radius of a circle is 2 inches; find the area of the segment cut off by a chord equal to the side of the inscribed equilateral triangle.

Third division

11 Show how to construct a right triangle when the segments of the hypotenuse made by the bisector of the right angle are given.

12 Show how to construct a trapezoid when the four sides are given.

13 Prove that in a parallelogram perpendiculars to the same diagonal from opposite vertices are equal.

14 Prove that if two equal chords of a circle intersect, their corresponding segments are equal.

15 Prove that the diagonals of a rhombus are unequal.