High School Department

179TH EXAMINATION

PLANE GEOMETRY

Wednesday, September 30, 1903—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 $12\frac{1}{2}$ credits. Papers entitled to 75 or more credits will be accepted.*

First division

1 Prove that if one straight line intersects another straight line the vertical angles are equal.

2 Prove that if three or more parallels intercept equal parts on one transversal, they intercept equal parts on every transversal.

3 Prove that in the same circle or in equal circles equal central angles intercept equal arcs.

4 Prove that two mutually equiangular triangles are similar.

5 Show how to construct a triangle equivalent to a given polygon. Give proof.

Second division

6 The altitude of a triangle is 12 feet and it divides the base into segments that are respectively 5 feet and 9 feet; find the perimeter of the triangle.

7 The base of a triangle is 18 inches and its altitude 9 inches; find the area of the trapezoid cut off by a line parallel to the base, 6 inches from the vertex.

8 The radius of a circle is 17 inches; the extremities of a chord are respectively 9 inches and 21 inches from a point in the chord. Find the distance of this point from the center of the circle.

9 Two secants drawn from C intercept arcs A and B; the smaller arc B, of 56°, is also intercepted by two tangents which form an angle having the same number of degrees as arc A. Find the number of degrees in angle C.

10 Find the area of a regular hexagon the radius of whose circumscribed circle is 5.

Third division

11 Show how to construct a right triangle when an acute angle and the altitude on the hypotenuse are given.

12 Show how to draw to a given circle, two tangents which shall form a given angle.

13 Prove that the bisector of the exterior angle at the vertex of an isosceles triangle is parallel to the base.

14 Prove that the sides of a triangle are inversely proportional to the corresponding altitudes on those sides.

15 Prove that if two circumferences intersect, any two parallel lines drawn through the points of intersection and terminated by the respective circumferences, are equal.