High School Department

167TH EXAMINATION

PLANE GEOMETRY

Wednesday, January 23, 1901 — 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 Define *five* of the following: oblique angle, ratio, locus of a point, decagon, apothem, hypothesis, similar sectors.

2 Prove that the perpendicular bisector of a given line is the locus of points equidistant from the extremities of the line.

3 Prove that if two circles intersect, their line of centers is perpendicular to their common chord at its middle point.

4 Write *three* theorems that conclude "the triangles are similar." Demonstrate *one* of these theorems.

5 Prove that an equilateral polygon inscribed in a circle is a regular polygon.

Second division

6 The sum of the interior angles of a polygon is 16 right angles; how many sides has the polygon?

7 In a circle whose radius is 17 inches, an arc is subtended by a chord 30 inches long; find the length of the chord of half this arc.

8 Find the area of a quatrefoil formed by four semicircumferences described externally on the sides of a square as diameters, the side of the square being 3 inches.

9 A rectangular field whose width is 7 rods and a square field whose side is 14 rods, have equal areas; find the number of rods of fencing required to inclose each field.

10 Two equilateral triangles have a side of one equal to the altitude of the other; find the ratio of their areas.

Third division

11 Show how to divide one side of a given triangle into segments proportional to the other two sides. Give proof.

12 Prove that if two adjacent angles of a quadrilateral are right angles, the bisectors of the other angles are perpendicular to each other.

13 Prove that the diagonals of a trapezoid divide each other proportionally.

14 Show how to construct an equilateral triangle whose altitude is a.

15 Find the ratio of the perimeters of two equilateral triangles, one inscribed in a circle, the other circumscribed about the same circle. Give proof.