University of the State of New York

186TH HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Wednesday, June 14, 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 two triangles are equal if the three sides of the one are equal respectively to the three sides of the other.

2 Complete and demonstrate the following: the sum of the interior angles of a polygon is equal to . . .

3 Prove that the tangents to a circle drawn from an exterior point are equal and make equal angles with the line joining the point to the center.

4 State how an angle is measured when formed by the intersection of (*a*) two chords, (*b*) a tangent and a chord, (*c*) two secants. Prove *one* of the theorems stated.

5 Prove that two triangles whose sides are respectively perpendicular to each other are similar.

Second division

6 The chord of an arc is 42 inches; the chord of half that arc is 29 inches. Find the diameter of the circle.

7 The diagonals of a rhombus are 10 inches and 24 inches respectively; find (*a*) the perimeter of the rhombus, (*b*) the perpendicular distance between two parallel sides.

8 The altitude of an equilateral triangle is 9 inches; find the area of the circumscribed and of the inscribed circle.

9 The radii of two circles are respectively 6 inches and 22 inches and the distance between their centers is 34 inches; find the length of their common exterior tangent.

10 Homologous sides of two similar figures have the ratio of 5 to 9; the sum of their areas is 212 square feet. Find the area of each figure.

Third division

11 Find the locus of the center of a circle tangent to each of two given concentric circles. Show that the conditions also determine the radius of this circle.

12 Show how to construct an isosceles triangle whose altitude is h, if the triangle is equivalent to a square whose side is a.

13 Prove that the bisectors of two adjacent angles of a parallelogram are perpendicular to each other.

14 Prove that the circumference described on one of the sides of an equilateral triangle as a diameter, bisects the other sides of the triangle.

15 Prove that an exterior angle of a regular inscribed polygon is equal to the central angle subtended by a side.