University of the State of New York

Examination Department

139TH EXAMINATION

PLANE GEOMETRY

August 1896 — Three hours, only

100 *credits, necessary to pass,* 75

Answer 10 *questions but* **no more.** *If more than* 10 *questions are answered only the first* 10 *of these answers will be considered. Division of groups is not allowed. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive* 10 *credits.*

1 Define *plane angle, scalene triangle, polygon, secant, incommensurable quantities.*

2 Prove that all vertical angles are equal. What is the complement of the supplement of 105°? the supplement of the complement of 75°?

3 Prove that the sum of the three angles of a triangle equals two right angles. The first angle of a triangle is twice the second and the second three times the third; find all the angles.

4 Prove that in the same circle or equal circles equal chords are equally distant from the center.

5 State three theorems in each of which the conclusion is *the triangles will be similar.* Prove one of these theorems.

6 Prove that the area of a circle equals the product of the circumference by one half the radius.

7 Given lines a and b, construct a line x so that $x = \sqrt{ab}$. Give proof.

8 If the upper base of an isosceles trapezoid is 8 inches, its lower base 16 inches, and each leg is 5 inches, what is its area?

9 Prove that if the diagonals of a quadrilateral bisect each other the figure is a parallelogram.

10 Give formula for (a) area of a circle in terms of its radius, (b) circumference of a circle in terms of its radius, (c) side of a square in terms of radius of circumscribed circle, (d) area of an equilateral triangle in terms of its side, (e) area of any triangle in terms of its sides.

11 Given a leg and an angle at the base of an isosceles triangle, construct the triangle. State one theorem used.

12 Find the area of a circular path 21 feet wide whose outer circumference is 484 yards.

13 How many lines can be drawn through a given point to make in each case an isosceles triangle with two given intersecting lines? Give proof.

14–15 The distance from a to b is 6 inches. A line is drawn from c to b making an angle of 45° and another line from c to a making an angle of 90° with the line ab. Find distance from a to c, from c to b and length of perpendicular from a to bc.