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*University of the State of New York*

# Examinations Department

115th examination

## PLANE GEOMETRY

**Wednesday,** August 16, 1893 — 2 to 5 p. m., only

100 *credits, necessary to pass,* 75

*Answer any* 10 *questions but* **no more**. *If more than* 10 *questions are answered only the first* 10 *of these answers will be considered. Each complete answer will receive* 10 *credits.*

NOTE — Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically.

1 Define *axiom, postulate, corollary, scholium, apothem.*

2 Represent by figures in which no line is less than one inch, two triangles equivalent but not similar; two polygons mutually equiangular but not similar.

3 Prove that if two triangles have three sides of one equal respectively to three sides of the other the triangles are equal in all respects.

4 A tangent and a secant meet without a circle forming an angle of 45°. The tangent is two feet long and the diameter of the circle is four feet: find the length of the secant.

5 Prove that equal chords in a circle are equally distant from the center and that of two unequal chords the greater is nearer the center.

6-7 The radius of a circle is two feet; find the areas of both the regular inscribed and circumscribed hexagons, and prove the correctness of each result.

8 Prove that in the same circle or in equal circles any two angles at the center have the same ratio as their intercepted arcs.

9 Of two similar sectors the first has twice the area of the second. The diameter of the circle of which the first sector is a part is 6 feet; what is the diameter of the circle of which the second sector is a part? Find the area of each sector when the angle at the center equals 60°.

10 Prove that the areas of similar triangles are to each other as the squares of their homologous sides.

11 Show how to construct a triangle equivalent to a given irregular hexagon.

12 Draw a rectangle and divide it by lines from one of the angles into four parts equal in area. Demonstrate the equality in area.

13 Prove that the area of a regular polygon is equal to half the product of its perimeter and apothem.

14-15 What is the area in square feet of a figure bounded by four semicircumferences described on the sides of a three foot square? How long would be the side of the square if the whole figure was $\frac{3}{4}$ as large? (Give results correct to one decimal.)