The University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES

PLANE GEOMETRY

Tuesday, September 11, 1917—9.15 a. m. to 12.15 p. m., only

Answer eight questions. Papers entitled to less than 75 credits will not be accepted.

1 Prove that the sum of the angles of any triangle is equal to two right angles.

2 Prove that an angle formed by two chords intersecting each other within a circle is measured by one half the sum of the arc intercepted between its sides and the arc intercepted between the sides of its vertical angle.

3 Prove that if from a point without a circle a secant and a tangent are drawn, the length of the tangent is a mean proportional between the whole secant and its external segment.

4 Prove that the areas of two similar polygons are to each other as the squares of any two homologous sides.

5 Prove that a circle may be circumscribed about any regular polygon, and a circle may also be inscribed in it.

6 If a circular garden and a square garden have each a perimeter of 160 rods, which contains the more land and how much more does it contain?

7 In a given sector whose angle is 90° inscribe a square. Show all construction lines.

8 Find the area of a trapezoid whose legs are 4 and 5 and whose bases are 8 and 11.

9 ABC is an inscribed isosceles triangle of which AB and AC are the legs. AD is a chord meeting BC in E. Prove that $\overline{AB}^2 = AD \times AE$.

10 If a hexagon is circumscribed about a circle, show that the sum of three alternate sides equals the sum of the other three sides.

11 If in laying a track a rail 10 feet long is bent through an arc of 5° 10′, what is the radius of the circle?