The University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES

PLANE GEOMETRY

Tuesday, September 13, 1927 — 9.15 a. m. to 12.15 p. m., only

Answer eight questions. Irrational results may be left in the form of π and radicals unless otherwise stated. Papers entitled to less than 75 credits will not be accepted.

1 Prove that the diameter perpendicular to a chord bisects the chord and the arcs which the chord subtends.

2 Prove that if through a point outside a circle a tangent and a secant are drawn, the tangent is the mean proportional between the whole secant and its external segment.

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

4 Construct a circle concentric with a given circle and having a given chord in the given circle as a tangent.

5 CA and CB are legs of an isosceles triangle. AD, a part of the first leg, is longer than BE, a part of the second leg. Prove that the angle DEB is greater than the angle EDA.

6 Each of two sides of a scalene triangle is produced its own length through the vertex of the triangle. Prove that the line which joins the ends is parallel to the base.

7 Find the area of a triangle whose base is 10 inches and whose base angles are 120° and 30° respectively.

8 Construct a triangle that shall have a given line for its base and shall be equal to a given square.

9 An equilateral triangle inscribed in a circle has a side 6 inches long; find the area included between the two figures.

10 The bases of a trapezoid are 30 inches and 12 inches respectively and the altitude is 9 inches; find the altitudes of the two triangles formed by producing the legs of the trapezoid until they meet.