The University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES

PLANE GEOMETRY

Tuesday, September 18, 1923—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 if two triangles have an angle of one equal to an angle of the other and the sides including these angles proportional, the triangles are similar.

2 Prove that two parallel chords of a circle intercept equal arcs.

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

4 ABC is an equilateral triangle; the bisectors of the angles B and C intersect at D. Prove that lines drawn through D parallel to the sides AB and AC trisect BC.

5 Given one side and the angle between the diagonals of a rectangle; construct the rectangle.

6 The upper and lower bases of a trapezoid are 5 inches and 8 inches respectively and the altitude is 6 inches. If the legs of the trapezoid are produced till they meet, find the altitudes of the two triangles thus formed.

7 Construct a square equivalent to a given scalene triangle.

8 Find the ratio of the areas of two circles inscribed in equilateral triangles, if the perimeter of one triangle is four times that of the other.

9 A triangle ABC is inscribed in a circle to which a second circle is externally tangent at A. If AB and AC are produced till they meet the second circumference at M and N respectively, prove that the triangles ABC and AMN are similar.

10 From a point without a circle two tangents are drawn, making an angle of 60°. The length of each tangent is 15 inches. Find the diameter of the circle.