The University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES

PLANE GEOMETRY

Tuesday, September 13, 1921—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 two triangles are congruent if three sides of one are equal respectively to the three sides of the other.

2 Complete and prove the following: The angle formed by two tangents drawn to a circle from an external point is measured by . . .

3 Prove that the areas of two similar triangles are to each other as the squares of any two corresponding sides.

4 A line drawn through the point of contact of two externally tangent circles is terminated by the circumferences. If radii are drawn to the extremities of the line and if one of the angles thus formed is 35°, find the number of degrees in the other angle and the relative direction of the radii. [Show all the work.]

5 With the two bases and an angle at the end of the longer base given, construct an isosceles trapezoid.

6 If a median of a triangle equals ½ the side to which it is drawn, prove that the triangle is a right triangle.

7 An equilateral triangle inscribed in a circle has a side 6″ long. Find the area included between the two figures.

8 *a* How many sides has a polygon the sum of whose interior angles is six times the sum of its exterior angles?

b The base of a triangle is 6″. A line is drawn parallel to the base, dividing one side into segments 5″ and 4″ with the greater segment adjacent to the base. Find the length of the line.

9 With a given altitude construct an isosceles triangle equivalent to a given triangle.

10 RST and XRS are two equivalent triangles with T and X on opposite sides of RS. Prove that XT is bisected by RS or RS produced.