University of the State of New York

Examinations Department

78th examination

PLANE GEOMETRY

Wednesday, Nov. 25, 1891—9:15 a. m. to 12:15 p. m., only

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40 *credits, necessary to pass*, 30

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

1. Define and illustrate (*a*) vertical angles; (*b*) secant of a circle; (*c*) incommensurable lines; (*d*) rhomboid; (*e*) regular hexagon. 5

2. Find the value of the angle formed by the bisectors of the acute angles of a right triangle. 3

3. Two arcs of equal length subtend the angles 20° and 30° respectively. If the radius of the first arc is 6 feet what is the length of the radius of the second arc? 4

4. Prove that if two triangles have two sides of the one equal respectively to two sides of the other, but the included angle of the first greater than the included angle of the second, the third side of the first will be greater than the third side of the second. 5

5. Prove that in a series of equal ratios, the sum of the antecedents is to the sum of the consequents as any antecedent is to its consequent. 3

6. Prove that the perimeters of regular polygons of the same number of sides are to each other as the radii of their circumscribed circles, and also as the radii of their inscribed circles. 4

7. If the lengths of the sides of a triangle are 33 feet, 21 feet and 18 feet respectively, what would be the length of each segment of the side 18 feet long, made by the bisector of its opposite angle? 4

8. If the radii of two concentric circles are 10 inches and 8 inches, what is the length of a chord of the larger circle which is tangent to the smaller circle? 2

9. Solve the following and prove the correctness of each construction:

(*a*) To divide a given line into parts proportional to any number of given lines. 3

(*b*) To construct a parallelogram, given two of its adjacent sides and the included angle. 3

(*c*) To circumscribe a circle about a given triangle. 4