The University of the State of New York

212TH HIGH SCHOOL EXAMINATION

SOLID GEOMETRY

Monday, January 18, 1915—9.15 a. m. to 12.15 p. m., only

Write at top of first page of answer paper (*a*) name of school where you have studied, (*b*) number of weeks and recitations a week in solid geometry. The minimum time requirement is two recitations a week for a school year or four recitations a week for half a school year.

Name the author of the textbook you have used in your study of solid geometry.

Answer seven questions, selecting three from group I and two from each of the other two groups.

Group I

1 Prove that every section of a cone made by a plane passing through its vertex is a triangle. [12]

2 Prove that if two angles, not in the same plane, have their sides parallel respectively and lying on the same side of the line joining their vertices, they are equal. [12]

3 Prove that a spheric angle is measured by the arc of the great circle described from its vertex as a pole and included between its sides. [12]

4 Prove that the sum of the face angles of any convex polyhedral angle is less than four right angles. [12]

Group II

5 Prove that if two lines, oblique to a plane, are parallel, their projections on the plane are either the same line or parallel lines. [16]

6 Prove that the three lines joining the mid-points of the opposite edges of a tetrahedron bisect one another, hence meet at a point. [16]

7 Prove that if a right section of a prismatic surface is an equilateral triangle, then every section which has one of its sides parallel to one of the sides of the given section is an isosceles triangle. [16]

Group III

8 A square pyramid has each edge of its base equal to m and each lateral edge equal to 10; express the volume in terms of m. [16]

9 It is desired to cut off a piece of lead pipe 2″ in outside diameter and $\frac{1}{4}$″ thick, so that it will melt into a cube whose edge is 6″; how long a piece will be required? [16]

10 A hole 4″ in diameter is bored through a sphere 10″ in diameter, the greatest amount of material possible being removed; find the volume of the part cut out. [16]