The University of the State of New York

216TH HIGH SCHOOL EXAMINATION

SOLID GEOMETRY

Monday, January 22, 1917—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 eight questions, including four from group I and four from group II.

Group I

Answer four questions from this group.

1 Find the locus of points in space equidistant from two given points, M and N, and also equidistant from two other given points, X and Y. State and prove the locus proposition on which this depends.

2 Prove that the sum of any two face angles of a trihedral angle is greater than the third face angle.

3 Prove that the volume of any pyramid is equal to one third the product of its base by its altitude.

4 Write the formulas for *five* of the following: (*a*) lateral area of a cylinder of revolution, (*b*) total area of a cone of revolution, (*c*) total area of a regular hexagonal prism, (*d*) total area of a hemisphere, including the circular base, (*e*) area of a regular tetrahedron of edge e, (*f*) area of a lune.

5 Prove that the sum of the angles of a spheric triangle is greater than two and less than six right angles.

6 Prove that two symmetric spheric triangles are equivalent.

Group II

Answer four questions from this group.

7 Considering the earth as a sphere with a radius of 4000 miles, find to the nearest thousand square miles the area of the triangle on the earth's surface whose vertices are the north pole, a point in zero latitude and zero longitude and a point in zero latitude and 36° west longitude.

8 Prove that if a line is parallel to each of two intersecting planes, it is parallel to their intersection.

9 A sphere has a surface of 49 square inches; find its volume. [$\pi = \frac{22}{7}$]

10 Show that the volumes of a cone, a sphere and a cylinder, all of equal diameters and hights (the hight of the sphere being also its diameters) are as 1 to 2 to 3.

11 A regular pyramid with a square base has each of its eight edges 4 inches; find the hight of the pyramid.

12 Prove that in the same sphere, or in equal spheres, if two sections are equal, they are equally distant from the center.