The University of the State of New York

225TH HIGH SCHOOL EXAMINATION

SOLID GEOMETRY

Monday, June 13, 1921—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 not more than four from group I.

Group I

Answer not more than four questions from this group.

1 Prove that if each of two intersecting lines is parallel to a plane, their plane is parallel to the given plane.

2 Prove that if two planes are perpendicular to each other, a perpendicular to one of them at any point of their intersection lies in the other.

3 Assuming the formula for the volume of a triangular pyramid, prove that the volume of any pyramid is equal to one third the product of its base and its altitude.

4 Complete and prove: A spheric angle is measured by . . .

5 Prove that the sum of the angles of a spheric triangle is greater than 180° and less than 540°.

Group II

6 *a* What is meant by the angle between a line and a plane?

  b Prove that if two parallel lines are oblique to a plane they make equal angles with the plane.

7 Prove that if a line is perpendicular to one of two intersecting planes, its projection upon the other is perpendicular to the intersection of the two planes.

8 *a* State a proposition that may be used to construct a plane parallel to a given line.

  b State a proposition that may be used to construct a plane perpendicular to a given plane.

  c Show how to construct a plane through a given point, parallel to a given line and perpendicular to a given plane.

9 What is the locus of points 6 inches from a given plane and equidistant from two given points?

Group III

Irrational results may be left in the form of π and radicals unless otherwise stated.

10 A monument is in the form of a frustum of a regular quadrangular pyramid 8 ft in height, the sides of whose bases are 4 ft and 3 ft respectively, surmounted by a regular quadrangular pyramid 3 ft in height, each side of whose base is 3 ft. What is the weight of the monument at 180 ℔ to the cubic foot?

11 The area of a sphere is 324 π square inches. Find the altitude of a right circular cylinder whose diameter is 6 inches and whose volume is the same as the volume of the sphere.

12 The chord of the polar distance of a circle of a sphere is 10 inches. If the radius of the sphere is 12 inches, find (*a*) the area of the circle, (*b*) the area of the zone cut from the sphere by the circle.