New York State Education Department 2.19

206TH HIGH SCHOOL EXAMINATION

SOLID GEOMETRY

Monday, January 15, 1912—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.

Answer eight questions, selecting four from each group.

Group I

1 If one of two parallel lines is perpendicular to a plane, prove that the other is also perpendicular to the plane.

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

3 State and prove the theorem for the area of a spheric triangle.

4 Prove that a truncated triangular prism is equivalent to the sum of three pyramids whose common base is the base of the prism and whose vertices are the three vertices of the inclined section.

5 Find the altitude of a frustum of a circular cone, if its volume equals 190 cu. cm and the radii of its bases are respectively 2 cm and 3 cm.

6 Find the volume of a pyramid whose base contains 30 sq. in., if one lateral edge is 5 in. and the angle formed by this edge and the plane of the base is 45°.

Group II

7 The volumes of two similar polyhedrons are 64 and 216 cu. ft respectively; if the area of the surface of the first is 112 sq. ft, what is the area of the surface of the second?

8 A solid metal sphere whose radius is 12 in. is recast into a spheric shell; the cavity is spheric and has the same radius as that of the original sphere. Find the thickness of the shell.

9 Prove that any section of a tetrahedron made by a plane parallel to two opposite edges is a parallelogram.

10 Prove that the volume of any regular pyramid is equal to one third its lateral area multiplied by the perpendicular distance from the center of its base to any lateral face.

11 Prove that if the four sides of a spheric quadrilateral are equal, its diagonals bisect each other.

12 What is the locus of a point in space equally distant from three given points? Demonstrate.