University of the State of New York

186TH HIGH SCHOOL EXAMINATION

SOLID GEOMETRY

Friday, June 16, 1905—1.15 to 4.15 p. m., only

Answer eight questions but no more. *If more than eight are answered only the first eight answers will be considered. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.*

First division

1 Define parallelepiped, polyedron, convex surface, element of a cylinder, spheric excess of a polygon.

2 Prove that a straight line perpendicular to one of two parallel planes is perpendicular to the other also.

3 Prove that if a pyramid is cut by a plane parallel to the base (*a*) the edges and altitude are divided proportionally, (*b*) the section is a polygon similar to the base.

4 Complete and demonstrate the following: the volume of any pyramid is equal to . . .

5 Complete and demonstrate the following: the volume of the frustum of a circular cone is equivalent to . . .

6 Show how to find the diameter of a given material sphere. Give proof.

NOTE—Use π instead of its approximate value 3.1416.

Second division

7 Find the volume of a regular tetraedron whose slant hight is $\sqrt{3}$.

8 Find the total surface of a cylinder whose volume is 8 times as great as the volume of a similar cylinder having an altitude of 5 inches and a base 6 inches in diameter.

9 A cone has a circular base whose diameter is 28 inches; a section of this cone through the axis, is a triangle whose legs are respectively 17 inches and 25 inches. Find the volume of the cone.

10 The volume of the frustum of a square pyramid is 74 cubic inches; the edges of the bases are 3 inches and 4 inches respectively. Find the altitude of the frustum.

11 The area of the section of a sphere 8 inches from the center of the sphere is 225π square inches; find the volume and the surface of the sphere.

12 Prove that the volume of a regular prism is equal to the product of its lateral area and one half the apothem of the base.